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Original Articles

A Plea for a Clinical Physiology

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It is universally recognized that physiology has been of the greatest assistance to medicine, although the investigations of the physiologist have been carried on without immediate reference to their practical application to medicine. His chief purpose has been to discover the nature of the various manifestations of life. From such investigations material has been provided which can be used in the practice of medicine. This has brought physiology into close relation with the practice of medicine, and physiology occupies an important position in the medical curriculum.

While recognizing the value to medicine of physiology, including the method of animal experimentation, and that the progress of medicine could not have been made without its assistance, the question nevertheless arises whether physiology as understood today adequately supplies the kind of knowledge which is required for the continuation of medical progress. While it has revealed many matters essential to medicine, can it be relied upon to give that intimate knowledge of living processes which is necessary for the solution of medical problems?

This question does not refer to academic physiology as a whole, but only to that portion related to medicine. In discussing the matter, it is necessary to deal with certain defects in knowledge, not to disparage experimental physiology, but to indicate how it can be rendered of greater value to medicine. The doubt as to the adequacy of physiology for medical progress arose from the following circumstance.

Physiology and the Reflex Arc.—At the St. Andrews Institute for Clinical Research we recognized that the knowledge of living processes at present available was not sufficient to enable us to understand the nature of the most common symptoms or the action of a single remedy. A great mass of symptoms had been accumulated, and in place of merely adding to their number, we resolved to try and find the laws that governed their production. We recognized that all phenomena in nature are subject to certain laws, and that the symptoms of disease, being phenomena in nature, are therefore subject to such law.

In the course of this inquiry we recognized that symptoms were, in the main, due to an increased or decreased activity of certain organs, which came about through an interference with those processes and structures which are concerned in regulating their activity. These processes are spoken of in physiology as "reflex," and we put forward the theory that symptoms were due to the disturbance of normal reflexes.

Shortly after this view was published I was informed by one or two physiologists that any physiologist could have told us that symptoms were produced in that way. I felt that if this were so it was a pity that physiologists should not have told us before, for it would then have saved me a great deal of work and time during the past thirty to forty years, during which I had been searching for the principles which underlay the production of symptoms.

But when the matter was looked into, it was found that no physiologist could possibly have given us this information, for the simple reason that physiology to-day cannot supply the knowledge of the processes and structures which regulate any single organ of the body, whether a simple structure like a capillary, or a voluntary muscle, or a hollow muscle, or a secreting organ. One will search physiological literature in vain to find a knowledge sufficiently accurate to enable the doctor to understand a single symptom of disease.

Physiology and the End Result.—One reason for this is that the academic physiologist is mainly concerned with end results. An end result is the outcome of a chain of events. The chain of events is represented by the activities of certain structures which are concerned in producing the reaction of the organ to a stimulus. When, for instance, in an experiment the sympathetic nerve, or the vagus, is stimulated, the physiological instrument records only a movement of the heart or the output of blood from the heart. Such records may be interpreted as an augmentation of the heart-beat, or a decrease. But no information is afforded which will explain the manner in which these reactions are brought about. We know now that there is interposed between these nerves and the heart muscle a series of structures which are involved in the production of the end result. It is the modification of the activities of these structures which results in the manifestations of health and the symptoms of disease. A knowledge of these, and the part they play in the movements of the heart in health and disease, is essential for the practice of medicine, but physiology at present is inadequate for the provision of such knowledge.

The physiologist has provided the knowledge up to a certain point, and it is necessary for progress that a form of physiological investigation should be employed that will give us a deeper insight into vital activities.

The Principle of the Reflex Arc.—In our attempts to get a better knowledge of the nature of ill-health and of disease, we sought for some principle which would guide us in our work. Much of research in all departments of medicine is haphazard and regulated by no guiding principle. We adopted as a guide what we call the "principle of the reflex arc." This is based on the fact that the functional activity of organs is dependent upon impulses which are brought to them by nerves, or structures having the same function as nerves.

The origin of every manifestation of activity is therefore to be found in some structure other than that which exhibits the manifestation. The application of the reflex arc involves the search for the structures concerned in the production of the manifestation.

When we began to apply this principle the great defects in medical knowledge were at once revealed. It is scarcely possible to convince either clinical observers or physiologists of the extent of these defects, and the effect they have of rendering the practice of medicine ineffective.

PHYSIOLOGY OF THE HEART.

If one were to make the statement that the explanation to-day of every cardiac reaction, however carefully recorded, is inexact, and in the majority of cases misleading, it would certainly not be accepted. Yet if the matter be carefully considered it will be found that it cannot but be true.

If it be borne in mind that the structure which exhibits activity is regulated and controlled by impulses generated and conveyed to it by other structures, it will be seen that to understand the activity of the heart those other structures must be recognized.

A description of the movements of voluntary muscles without any reference to the part played by nerves would be defective, and the explanations given of these movements would be mere guesswork, and wrong guessing at that. The muscle fibers of the heart whose movements are recognized are as definitely under control of the conducting system as the muscles are under the control of motor nerves. Yet in the

interpretation of the movement of the heart the conducting system is either ignored or imperfectly recognized. Marey's observations on the frog's heart are quoted to-day in physiological text-books as if they were beyond dispute. The interpretation of the early experiments on the vagus nerve still holds the field. As all these observations were made before the existence of the conducting system was known, this interpretation is bound to be defective. The fact that the vagus, when it affects the heart's rate or rhythm, does so only through its influence upon the conducting system, has not been appreciated. What little is known to-day of the conducting system is merely the result of some crude experiments, or a few clinical observations for the most part imperfectly understood.

The Law of "All or Nothing."—Probably nothing illustrates so well the need for a clinical physiology as the profound belief in the law of "all or nothing." This law is accepted to-day as an article of faith. As a matter of fact, it is an experimental result, and while true for the manner in which the heart contracts in response to artificial stimulation it is not true for the heart contracting under normal conditions.

This becomes evident if the manner of stimulation in experiment and in nature be considered. An electrical stimulus is one which nature never uses. It spreads by any structure which is capable of conducting it, and in its spread it is not guided or regulated, but stimulates every susceptible cell which it meets. By this method of stimulation the heart may contract according to the law of all or nothing.

On the other hand, if we consider how the normal contraction is produced, it will be seen that there can be no resemblance between the artificial and normal contractions. The stimulus for contraction of the ventricle arises as impulses thrown out by the sino-auricular node. These impulses are not electrical in their nature, but represent a form of energy which is only produced by living cells, and capable of being conducted only by living cells. From the S. A. node they pass by structures specially developed for the purpose of their conduction. They reach the ventricle by the auriculo-ventricular bundle, and enter the ventricle at a particular part, and within the ventricle the bundle breaks up into a great number of branches which are distributed to every portion of it. Manifestly this arrangement implies that the contraction of the heart normally starts at a particular place, and that each part of the ventricle is stimulated to contract in a sequence which results in an effective emptying of the chamber. Moreover, there is evidence to show that the heart, like every other muscular organ of the body, only uses as many fibers for each contraction as the circumstances require.

In other words, the contraction of the ventricle is governed by the alternating activity of its fibers, that is, by the law of fluctuation, and not by the law of "all or nothing."

The Law of Fluctuation.—In our investigations we find evidences that justify us in stating that all organs are governed by this law of fluctuation. Experimental physiology has failed to reveal this law, simply because it cannot provide the conditions which will show it, as in the case of the heart. It is a law which can only be recognized by the study of the organ acting in response to normal stimulation.

It is at present assumed that the reactions obtained by such forms of stimulation as electricity are normal reactions, whereas the stimulus, being an artificial one, can only give rise to artificial results.

It is for this reason that the law of fluctuation has been missed, and such a law as that of "all or nothing" has been adopted. The former can never be recognized by artificial stimulation, so that it can safely be predicted that the true physiology of an organ as distinct from experimental physiology will never be understood until the law of fluctuation is applied to the interpretation of reactions.

The Importance of the Conducting System.—Although I have been an assiduous student of the heart as seen in physiology and in clinical medicine for over forty

years, I had but a confused idea of the heart's movements until in recent years we evolved the principle of the reflex arc, and the law of fluctuation. By the application of this principle and law to the interpretation of cardiac phenomena there has gradually been revealed a field of observation whose value it is impossible to overestimate, not only for the interpretation of cardiac phenomena alone, but also of those processes which are concerned in every form of vital activity. The study in this manner of the sino-auricular node and the auriculo-ventricular node, more especially the latter, enables us to understand the processes of stimulation and inhibition. The description of these processes in physiological text-books is so confused and incomprehensible that it is impossible to obtain a clear understanding of their nature. The observation of these two nodes as revealed by the disturbances found so frequently in clinical medicine affords the opportunity for investigating these processes in a manner afforded by no other structure of the body, nor by any experimental method. In a like manner the action of the vagus and sympathetic can be studied with much greater precision. Many movements of the heart which it is impossible to explain, while our ideas are dominated by the law of "all or nothing," are now explicable by the law of fluctuation. The action of remedies such as digitalis may also be investigated with a particularity that opens up a new field in pharmacology.

Indeed it is not possible yet to estimate the extent of the opportunities afforded by this line of investigation. It holds out the possibility of throwing light upon many of the functons of the brain. Like the brain, the conducting system not only discharges impulses which produce definite reactions, but it does this, as does the brain, so that the reaction is regulated and controlled to adapt it to a definite purpose. Inasmuch as the constitution of the conducting system is so much simpler, the vital processes become easier of observation, and from these simpler effects we can interpret the more complex effects in the highly developed nervous system. In fact, in one sense we might look upon the conducting system as a rudimentary brain of the heart.

The Afferent Nervous System.—The great bulk of symptoms are the results of impulses conveyed into the central nervous system by afferent nerves. The state of knowledge of these afferent nerves is such that to-day it is impossible to understand how any symptom is brought about.

Experimental physiology has given us a great deal of information about the efferent autonomic system because, by its methods of stimulation, a demonstrable result is produced, as in the contraction of a muscle or the secretion of a gland, but such methods usually fail to elicit a response when applied to an afferent nerve. The reason for this is that the peculiar functional part of an afferent nerve is situated at its peripheral field in the different organs. Section of the nerve and stimulation of either cut end fails to give its peculiar reactions. The clinical evidence of the presence of the afferent nerves is abundant. By the study of such a physiological event as the contraction of the parturient uterus, we can recognize the stimulus which excites the afferent nerves and can detect the result in the pain, flushing, sweating, increased pulse rate, nausea and vomiting which frequently accompany the uterine contraction. Such opportunities for investigating the afferent system of nerves are afforded by almost every organ of the body, and the physician and surgeon have ample opportunities for such investigation, did they possess some definite principle to guide them.

To a great extent these opportunities have been lost sight of since physiology was separated from clinical medicine. The expectation that the academic physiologist could provide this kind of knowledge has obscured the path which medicine should pursue, so that the magnificent opportunities of the clinician are imperfectly utilized. The development of surgery, for instance, has opened up unrivaled fields for explora-

tion. However valuable a modern surgical text-book may be as a record of manual dexterity, it is in another sense a monument of wasted opportunity. The inspirations of John Hunter and William Beaumont are sorely needed.

PAIN.

The poverty of modern medicine in ideas or concepts is well illustrated by the attitude of the profession to pain, the most clamant, the most universal and the most diagnostic of symptoms. Though it has been a matter of discussion and investigation for ages, by physicians, surgeons, and physiologists, yet to-day we are provided with nothing but a mass of guesses as to its nature and origin, while its diagnostic significance is barely appreciated. A condition like angina pectoris is a perennial subject for discourses and discussions, and these consist mainly of futile speculations. In the production of pain there are definite structures and processes involved, but what these are no one knows. If the matter be considered it will be found that one might as well attempt to make bricks without straw as to solve the problem of pain without this kind of knowledge. The sad part of the matter is that medicine has not advanced far enough to know how to set about the solution of a problem of this sort.

THE EVIL OF SPECIALISM.

One of the great hindrances to the progress of medicine is specialism. The specialist is of necessity a man with a limited experience and this leads to a limited outlook. When his work is directed by others with a wider outlook he is invaluable. When the direction of an enterprise is in the hands of a number of specialists, failure is bound to follow, for the simple reason that there is no one with that wide outlook to recognize the kind and number of specialists required, and apportion to them their appropriate tasks.

Education in medicine is to-day dominated by a body of specialists, and not one of them has had that wide experience of medicine which would enable the relative importance of the different subjects to be understood, in order that the student be taught only that part of special subjects which is essential to him in his future work as a doctor. The consequence is, he is to-day forced to learn a vast amount of stuff that will never be of use to him, while many essential matters are left out of his education. Amongst many instances the question of a woman's ability to undergo the strain of pregnancy whose heart is in a dubious state is an example. This is a problem requiring a certain kind of physiological knowledge, but the physiologist cannot provide it. The cardiologist never sees a woman in labor, and the gynecologist knows little or nothing, or, what is worse, may have a wrong knowledge of the heart. And yet our educational authorities are incapable of appreciating what this state of affairs portends.

The Agent which Stimulates—the Cell Impulse. — The experimental physiologist knows a good deal about the force he employs when he uses electricity, and physicists have given much study to electricity as a force. It is imperative that more knowledge should be obtained of the form of stimulation which nature employs, as it is one with which the physician and the clinical physiologist deal. I have elsewhere drawn attention to the fact that it is a form of energy having properties as peculiar and as distinctive as the forces of gravitation and of electricity. Such a force has no doubt in a measure been long recognized, and has formed a subject of speculation for centuries. Dr. Gregory, 130 years ago, comments upon these speculations in his day. Some considered the force a "trembling or vibration of the substance of the nerve;" others attributed it to a "subtile and very active fluid," while "others had recourse to an universal æther." How far knowledge has progressed since then can be inferred from the description given by modern physiologists, who refer to it variously as a "propagated disturbance," an "excitation wave," "electricity," an "ade-

quate stimulus," "motor and sensory impulses," "proprio-ceptive, noci-ceptive impulses," etc., etc.

The employment of so many terms implies a confusion of mind, inasmuch as the terms are based upon the effect the agent produces and not upon the agent itself, so that a contraction of a muscle is described as indicating the presence of a "motor impulse;" pain indicates the presence of a "noci-ceptive impulse," or a "sensory impulse." One might as well describe a "vomiting impulse" or a "sweating impulse" or a "nausea impulse," when other evidences of activity are produced.

The matter is put in this way to show that the use of such terms indicates the failure to appreciate the distinctive peculiarities of the cell impulse. This impulse being a force in nature is as invariable as electricity, consequently the character of the reaction does not depend upon the impulse but upon the cells which it stimulates.

The Relation of Physiology to Pathology.—There exists a good deal of confusion concerning what is physiological and what is pathological. It is usually accepted that in ill-health there is some pathological stimulus employed which is quite distinct from that which occurs in nature or in physiological conditions, and in consequence the academic physiologist is not concerned with the reactions of ill-health as they are not supposed to be physiological.

As a matter of fact, what are called pathological reactions are nothing more nor less than an increase or decrease of normal reactions. There is no new agent introduced. When the process of stimulation is better understood, this will be realized.

The agents of disease act only by increasing or decreasing the excitability of cells or by increasing or decreasing the number of impulses. The impulse itself is the same in health and in disease, and it is the force or form of energy which produces a reaction.

On the other hand, the force or energy which the physiologist employs in using electricity is an abnormal stimulus, one that nature never employs, and in consequence the reactions are of a kind that nature never gives. Attention has already been directed to this fact in explaining that the law of "all or nothing" is an experimental result, and that nature never employs this law in the regulation of the activity of organs.

When the physiologist employs other means such as a chemical agent, or heat or cold, he is imitating exactly the methods of stimulation which occur in pathological states. The symptoms of disease are often the same as physiological reactions.

Speculation in Medicine.—A clinical physiology of the kind that I have in mind would do a great deal in preventing that wild speculation which even at this day renders medicine a subject of ridicule. If it be kept constantly in mind that no manifestation of the body, whether a movement, a secretion, or a sensation, can take place without the reaction of a cell to an impulse, it would stop a great deal of that use of vague terms which injures every department in medicine. Medicine has descended in a constant stream through many centuries, and the characteristics of bygone ages are still reflected in present-day medicine. In the past, when certain manifestations were observed, knowledge was so defective that explanations purely imaginary were employed. When a reaction was obtained, an explanation had to be given, and this old method of guessing is still dominant. So firmly established is this method to-day that branches of medicine are based entirely upon it, such as psychology.

The result is that the greatest authorities are not men with scientific minds but those with the most exuberant fancy. But the same method is found in every department. The term "centers" is in universal use, and it is not realized that a center is but a figment of the imagination.

Such terms as cardioinhibitory center, vasomotor center, vomiting center, respira-

tory center, are in common use. The term seems to connote something that many people believe to be a definite structure. Such an idea having gained currency it becomes the easiest matter to explain difficulties by evolving new centers, and even to divide them up into numerous subdivisions. Thus, there is not only a respiratory center, but an inspiratory center, an expiratory center, an apneustic center, and so forth. We even find such expressions used as an increased "tone of the inhibitory center," no one having the remotest idea of what constitutes tone or inhibition or a center. Other difficulties are overcome by inventing a "synaptic membrane" which gradually becomes endowed with remarkable attributes.

Such terms should be eschewed by the clinical physiologist, and his ignorance should be freely acknowledged, because in that way the defects of knowledge would be recognized and strenuous attempts made to remedy them, in place of making suggestions that hide the defects.

The Science of Medicine.—It is now time that it was recognized that medicine is a subject dealing with natural phenomena with aims and objects peculiar to itself and requiring methods as distinctive as any other science. The impression is generally held that the introduction of the methods used in Physiology, in Chemistry, or in Bacteriology, tend to make of medicine a science. Nobody would imagine that the use of chemistry in botany tends to make of botany a science, nor can the chemist claim to belong to the scientific side of botany. Yet laboratory subjects such as chemistry, physiology, and bacteriology are sometimes spoken of as belonging to the "scientific" side of medicine, the implication being that the clinical side is not "scientific." It cannot be too strongly insisted upon, that the assistance rendered by these subjects is of an elementary kind, and though necessary, they cannot provide that knowledge which is required for the solution of medical problems. Medical science demands the carrying of investigation far beyond the reach of the laboratory worker. When the medical investigator has obtained a sufficient knowledge to enable him to recognize the vital processes and living structures which are concerned in the production of ill health, he has just rendered himself able to carry scientific medicine into a higher level. The next step is to assess the value of the symptoms of disease. It is only by this kind of knowledge that the relative importance of symptoms is recognized. The doctor must be able to tell whether there is danger present, not only to life but to health, and clearly to recognize wherein the danger lies. It is only when this information is obtained that steps can be taken to combat the danger. This is also the first step to a scientific therapy, for without this kind of knowledge all forms of treatment, whether successful or not, will remain empiric.

CONCLUSION.

If experimental physiology is to benefit suffering humanity, a supplementary physiology dealing with normal activities and those produced by disease must be employed, and experiment should be guided by the needs of the clinical observer. To a physiologist who is also a clinical observer, the kind of experiment that is required is bound to be much clearer than the somewhat blind endeavors that have characterized the attempts to solve clinical problems in the past.

If the kind of physiology which clinical observation can reveal be not acquired, most of the enterprises which are concerned in the solution of the problems of disease will result in failure, or achieve a measure of success out of proportion to the time and energy spent.

The knowledge of physiology obtained in this way is limited to explaining the derangements which result in ill health and cannot of itself solve the problems of disease, but it is an essential adjunct. Until it is acquired, the work of the bacteriologist, of the pharmacologist, of the biochemist, as well as the clinician, will fall far short of attaining the objects of their endeavor.

What is Glucose?—An Important Point in Therapeutics[1]

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There is a wide-spread interest in the medical profession concerning carbohydrates which are easily assimilated, sugars, suitable for invalid and infant feeding, as well as subcutaneous, rectal and intravenous injection. Practically all articles published on this subject, and authorities who have undertaken thorough investigations, recommend and advise the use of a form of sugar commonly referred to as "glucose." When this term is used without explanation, confusion arises and naturally brings up the question, "What is glucose?"

The reason for this confusion is very simple. The explanation and clarifying of the situation is important for medical practitioners in order that they may always be perfectly sure of the product which is specified and which they desire to use for any particular purpose.

The term "glucose" was originally used only in a chemical sense, being synonymous with dextrose. It denotes that member of the sugar group having the chemical formula $C_6H_{12}O_6$, being the aldehyde derivative of a polyatomic alcohol. It is a monosaccharide, as distinguished from the disaccharides (sucrose or cane sugar) and polysaccharides. The name "dextrose" has been applied to the same chemical individual because of the fact that a solution of this sugar turns the plane of polarized light to the right, that is, it is dextro-rotary. This sugar is formed by nature in the life process of many plants, as well as being one of the components of so-called invert sugar, formed by the hydrolysis of cane sugar or sucrose. It is also produced by the hydrolysis of starch. In fact, cane sugar (sucrose) and starch are first transformed into dextrose (glucose) by the digestive processes before assimilation. When the nutritive value and ease of assimilation of glucose became established, the recognition of the commercial value of the product soon followed. It was found that the separation of glucose from those portions of various plants and fruits in which it had already been formed by the life process, or its preparation from sucrose (cane sugar) while possible, could not be carried out on a commercial scale successfully. Recourse, therefore, was had to a material produced in plant life which is abundant in supply, accessible and amenable to manufacturing operations, namely, starch. There are many sources in the vegetable kingdom from which starch may be obtained commercially, but the two most important are Indian corn (maize) and the common potato.

Corn starch and potato starch are the crude materials used for producing glucose or dextrose commercially. In the early stages of the industry, it soon became possible to manufacture syrups of different concentrations and solid products of varying degrees of purity containing glucose, but until a comparatively short time ago pure dextrose or glucose was more or less a chemical curiosity.

Corn syrup made from corn starch and potato syrup made from potato starch, on account of the large percentage of glucose or dextrose contained, came to be known commercially as "syrup glucose" or "glucose." Outside of strictly chemical circles, glucose is understood to mean the dextrose or glucose containing syrup made from corn starch or potato starch. However, in this country practically no glucose is produced from potato starch, and commer-

[1]Medical literature at the present day constantly makes reference to the use of "glucose" in association with salt solution or bicarbonate of sodium solution, or by itself with water, for intravenous, intraperitoneal, subcutaneous, or rectal administration. Inquiry on the part of the Editors of the THERAPEUTIC GAZETTE shows that most, if not all, of the writers simply order glucose, apparently considering that it was always of a certain standard of purity. For this reason they have asked Dr. W. R. Cathcart to make a statement in regard to this matter of very great practical bedside importance.

cial glucose may be accepted as the corn syrup manufactured from corn starch. The crude solid forms of glucose are referred to generally as "corn sugar" and sold under various trade names designating their purity and uses. These uses are mostly industrial, comparatively small amounts being consumed directly. In different countries, various terms are used to designate the different forms of commercial glucose. In England, for instance, the syrup manufactured from corn starch is called "liquid glucose," while the product known in this country as "corn sugar" is traded in under the name "solid glucose."

GLUCOSE (CORN SYRUP).

This product is a water-white, clear, heavy syrup, thick at ordinary temperatures. It is sold in different degrees of concentration, usually ranging from 42° to 45° Bé. Corn syrup or commercial glucose showing a gravity of 43° Bé. has approximately the following composition:

	Per Cent.
Moisture	17.5
Dextrose or Glucose (calculated as reducing sugar)	34.7
Dextrine (non-reducing carbohydrates, not starch)	47.5
Mineral matter (ash)	.3

Glucose (corn syrup) is used in many manufacturing operations, but by far the largest consumption is accredited to the preparation of various products ultimately consumed as food, such as confectionery, jams, preserves, bread, cake, and many forms of table syrup. Corn syrup intended for food consumption must, of course, conform strictly to the requirements of the pure food laws, both national and State. These requirements are being met successfully by the manufacturers. The extensively advertised and generally used "Karo Syrup" has justly aroused the interest of practicing physicians and the medical profession in general. For this reason a brief discussion of the product is appropriate.

Karo syrup is sold by the grocery trade generally under two brands, viz., Red Label (White Karo) and Blue Label (Regular or Brown Karo). These brands have the following approximate composition:

RED LABEL.

	Per Cent.
Moisture	23.5
Dextrose or Glucose (calculated as reducing sugar derived from corn syrup)	31.42
Sucrose (cane sugar)	7.00
Dextrine (non-reducing carbohydrates, not starch)	36.97
Mineral matter	1.10

This product, therefore, is glucose (corn syrup), to which has been added sucrose (cane sugar) to increase the sweet taste. It is flavored with vanilla extract and contains in addition a small amount of salt, shown in the mineral matter reported. These additions are solely for the purpose of appealing to the popular taste.

BLUE LABEL.

	Per Cent.
Moisture	25 00
Dextrose or Glucose (calculated as reducing sugar derived from corn syrup)	30.34
Sucrose (cane sugar, derived from refiners' syrup)	2.28
Invert sugar (derived from refiners' syrup)	4.57
Dextrine (non-reducing carbohydrates, not starch)	36.11
Mineral matter	1.70

This Blue Label product is glucose (corn syrup) mixed with "refiners' syrup," obtained in the manufacture of cane sugar, for the purpose of increasing the sweetness sufficiently to meet the popular taste. The addition of refiners' syrup explains the presence of sucrose, invert sugar, and increased mineral matter in the Blue Label brand.

Both of these products, Karo, Red Label and Blue Label, on account of the large percentage of dextrose (glucose) and the low percentages of sucrose (cane sugar) and invert sugar present, are recognized as valuable purveyors of easily assimilated carbohydrates, least liable to digestive fermentation and disturbance.

The value of glucose syrup and Karo syrup as highly nutritive and easily assimilated carbohydrate-food may be accepted as established beyond all question. The results obtained under the close observa-

tion of specialists have been highly satisfactory. That these syrups are equally as suitable for rectal, subcutaneous and intravenous injection as for food purposes cannot be regarded at the present time with the same assurance. The analyses given above show a dextrine, sucrose and mineral content (ash) in addition to the dextrose value. The presence of dextrin, sucrose and mineral salt may be undesirable from the standpoint of injectional application. On the other hand, the mineral salts and dextrin may be distinctly beneficial. It has been suggested that dextrin is a desirable constituent of the product for purposes of injection because it is changed into dextrose gradually, and the absorption of dextrose is therefore not likely to be more rapid than the system can utilize advantageously. It is doubtful whether this point has been sufficiently investigated. The value of dextrose for the various forms of injection is perfectly well known. In the present state of knowledge it is clearly advisable to specify "chemically pure dextrose" for purposes of injection rather than simply "glucose." Inquiry discloses that the druggist will most assuredly supply glucose syrup (corn syrup) whenever simply glucose is called for.

During the last few years manufacturing processes have been so markedly improved that dextrose or glucose in the chemical sense (a product heretofore rarely found outside of the chemical laboratory) has now become a regular fixed article of commerce. This product stands out as evidence of the application of scientific methods to industrial operations. It is offered under the trade names discussed below.

"REFINED CERELOSE."

This form of dextrose is a hydrous crystal containing water of crystallization amounting to theoretically 9 per cent. The composition is shown by the following typical analysis:

	Per Cent.
Moisture	7.80
Dextrose	91.74
Dextrine (non-reducing sugars)	.37
Ash	.09

On the dry basis therefore the purity of the dextrose is 99.5 per cent. The product is manufactured in the form of small white crystals or crystalline aggregates, or powdered, as desired. The food uses of refined cerelose have developed rapidly. This form of sugar is already established in certain important food industries, being used by bakers, confectioners, ice-cream manufacturers, etc., replacing entirely or in part sucrose or cane sugar.

The possibilities of the application of refined cerelose to the preparation of other important food products is of special interest to the medical profession. As is well known, sweetened condensed milk is preserved by the large percentage of sucrose (cane sugar), which is necessarily compounded with the milk to prevent fermentation. The unavoidable presence of this large amount of sugar is open to criticism. The excessive sweetness of sweetened condensed milk palls the taste. The high percentage of carbohydrate (sucrose) contained unbalances the food value. The indications are that sweetened condensed milk manufactured with dextrose will have distinct advantages over that prepared with sucrose. Dextrose is not nearly so sweet to the taste as sucrose; the ratio is commonly stated as 3:2. Theoretical considerations indicate that the preserving power of dextrose is considerably higher than that of sucrose. The preserving power of sugar solutions is supposed to be a function of the osmotic pressure of the solutions. Experimental data show the osmotic pressure of a 15.25-per-cent dextrose solution to be equal to that of a 24.93-per-cent sucrose solution. If this ratio holds for preserving power, then the amount of sugar necessary to preserve sweetened condensed milk could be reduced 38.8 per cent; if dextrose were used instead of sucrose, only 61.2 per cent of the usual amount of sucrose need be present as dextrose. It is manifest that this difference has a very important bearing upon the use of sweetened condensed milk for the feeding of infants and children. The ratio of carbo-

hydrates is made decidedly more favorable and the carbohydrate in the form of dextrose is more easily assimilated. It is quite possible that the difference in the assimilation of the sugars in question is closely related to the difference in osmotic pressure of their respective solutions. At any rate, refined cerelose and the Karo syrups discussed above are well worth the attention of pediatrists.

EXOSE.

In appearance and properties, this product is identical with refined cerelose, the only difference being that it shows higher dextrose purity on the dry basis; approximately 99.85 per cent dextrose. This high purity is unnecessary for general food purposes, but is important in special cases of infant and invalid feeding. The use of exose is practically limited to this field.

C. P. DEXTROSE.

The final and likewise highly important use of dextrose to be discussed here is that for subcutaneous and intravenous injections. No argument is needed to establish the fact that a product used for such purposes should be of the very highest possible purity. This condition has been met by the production of c. p. dextrose, which is recommended and accepted for the purposes indicated. It would appear extravagant to claim a purity on dry basis of 100 per cent, but investigations indicate that 99.99 per cent is justified and attained.

Until further knowledge and experience is available, only c. p. dextrose should be prescribed for subcutaneous and intravenous injections. The product is a white crystalline powder and may be obtained commercially if specially demanded.

That the scope of this article is not intended to be an exhaustive discussion of the properties and application of dextrose is obvious. It is hoped that the confusion of commercial glucose with dextrose or "chemical glucose" has been sufficiently explained.

Drug Addiction—A Symptom

BY JOSEPH C. DOANE, M.D.

Medical Director and Superintendent, Philadelphia General Hospital

There seems to be much confusion on the part of the public relative to the true nature of narcotic addiction. Nor are misconceptions in regard to drug abuse wholly confined to the layman, for not a few physicians appear to have but little idea as to the existence or nature of either the cause or the cure of this condition. This confusion of mind is not helped by the careless, and usually uninformed, lay and medical use of such terms as "cure," "drug habit," "drug disease," "dope fiend," "degenerate," etc., *ad nauseam*, without first inquiring as to what is to be cured, and why a "habit" requires hospitals and drugs to remove it.

It is the purpose of this sketch, therefore, to endeavor to set forth in as concise a manner as possible some facts relative to the nature of drug inebriety, and also to suggest to the practicing physician some measures relative to handling these difficult cases.

During the past ten years the writer has had an excellent opportunity to observe a great number of drug patients. These persons, whom we must call addicts, for want of a better term, cannot help but arouse mixed feelings of disgust and of pity in the mind of the physician.

It is, first of all, not to be denied that drug users, as a class, are of two kinds—those of education, and of more or less stable moral and mental make-up, who through ignorance, accident, or disease have acquired an uncontrollable need for

the continued use of opium or one of its derivatives; and a second class, the members of which display a conspicuous absence of any of the above traits, save the need for drug.

The former group, unfortunately, is in the great minority. In a large municipal institution, the greater number of patients applying for treatment for drug addiction represent the latter class, and probably ninety to ninety-five per cent of the four thousand cases treated at the Philadelphia General Hospital, in the last eight or ten years, have been of this type.

It would be instructive if a composite picture of the traits, both mental and physical, which are presented by this great group of persons could be accurately sketched. This the writer cannot do, but a brief review of some of their characteristics will be given.

In the first place, since it is necessary to secure drug by stealth and sly dealing, and because to procure an opiate is to live, these traits are prominently displayed. The difficulty of securing complete isolation during treatment is known to all.

All are sallow of countenance and shifty of eye, if the drug has been long used. Many are emaciated, and most wobegone in appearance. Most of these men and women, when asked a direct question as to why they find themselves in their present predicament, elaborate a fable in which they appear in rather the light of having been sinned against than themselves being the offenders. If one is inclined to be credulous the inquiry will end there, but if the search for the real cause is pressed further, certain evidences of character instability, or of mental deficiency, will come to light. Numbered among these traits will frequently be found the following:

Early delinquency in school; incorrigibility, frequently necessitating court intervention; early and ill-advised marriage; inability to long hold any position; a wanderlust, expressed by becoming attached to a cheap carnival or circus company; and, finally, voluntary association with persons of uncertain or unhealthy moral tone.

A careful psychological study of these patients will disclose not a few cases of retarded mental growth, and physical examination often shows frequently occurring stigmata of degeneration. In twelve per cent of four hundred and ninety-three of the writer's cases such signs were noted.

In regard to the history of more recent events in the drug-taker's life, his memory is conveniently hazy. He reluctantly admits more or less frequent apprehension by the police for petty infractions of the law, and to him marriage as an institution is often considered an unnecessary refinement of society. Partnership with a prostitute is not uncommon. His respect for the rights of others, in so far as property ownership is concerned, is purely a relative matter, and directly governed by the acuteness of his own need for drug.

If the above statements apply more or less generally to this class of patients, it is pertinent to inquire what relation this fact bears to that other common attribute, namely, the continued use of one of the opiates. To be concise, is the use of the drug the cause or the effect of this long list of character faults? Is it possible that the use of narcotics is neither, but that it ranks only as one of these distressing vices, the cause for all of which is a common one? The writer is of the belief that this was true in a great percentage of the cases which he has studied. If this be so, is it not just as reasonable to expect that purging and sedation and hyperalimentation will cure prostitution, larceny, assault, indecency, mental enfeeblement, and the hundred and one other offenses against society, as to expect that two weeks, two months, or two years of hospital treatment will bring about any permanent relief from the desire or need for the effect which drug narcosis of any grade affords?

I know of no therapeutic agent which has the ability to replace flabby will-power with firm and healthy resolution; the power to search out and metamorphose lying, and deceit, and immorality, and disrespect for honest men and money, into straightforwardness, and chastity, and good citi-

zenship. Nor is there to be found any remedy which can so lift the horizon of the addict's daily life that discouragement, a knowledge of his own inferiority, and a disbelief in the sincerity of any one will not press down on him and overwhelmingly cloud his vision of the better and nobler things of life.

Drug addiction as a symptom, then, of a serious defect of character, or a lack of physical stamina, requires a readjustment of our views, both as to prognosis and treatment, and explains why most of the treated cases sooner or later relapse. Such drug patients come into the hospital ward with a distressing symptom of a serious mental or physical defect. The physician, with his hyoscine, belladonna, and blue mass, relieves the symptom, and the patient leaves the ward with the causal factors still unrelieved, and, as always happens when symptoms and not causes of symptoms are treated, the relief is but temporary. I do not believe that heroin and morphine have any inherent powers to quickly decay character, but I do affirm that decayed or deficient character is prone to lead to the use of heroin. When the double toxemia, caused by the ingestion of a drug which slows excretion and produces an autopoisoning of its own, is present, and when the patient learns that further recourse to the drug produces ease and exhilaration, there is no difficulty in understanding the continuance of the drug's use. The important question to explain is the reason for the initial ingestion.

As an example of the well-meant but, to the writer, utterly worthless steps suggested for the solution of this problem is the contention by some that if the hypodermic syringe were made unprocurable by the public, the drug problem would be solved. This suggestion, to be efficacious, should also include the abolishment of Yankee ingenuity, for a medicine dropper, some wet paper for the tip, and a hypodermic needle will make a serviceable substitute. The removal of heroin from the Pharmacopœia, and the interruption of its manufacture, if possible, would only deprive the physician of a remedy which is frequently most useful, and would leave the same vicious traits intact in its former users.

The purging of the medical profession of those comparatively few members who are not blessed with high ideals of service and personal rectitude, and who prostitute professional prerogatives by lowering themselves to the level of narcotic venders, would be a signal service to its great majority of ethical, honest, and self-sacrificing physicians. This can best be accomplished on a preventive medicine basis, in the medical schools. Here is the time to spare the public by exerting greater care in the bestowal of degrees, and here also is the time to introduce into the curriculum some clinical instruction relative to the detection of personality traits, which make continued use of a narcotic drug a strong likelihood.

Finally, the writer desires to enter a protest against the commercial and very secretive atmosphere which is thrown around many institutions where these unfortunate patients are treated. No one denies that a meager percentage of these cases can be cured by careful, scientific treatment, but the formulæ used are not difficult to master, and are not specific in any "unpoisoning way." To promise a "cure" in too large a percentage of cases is to be professionally dishonest, unless the successful withdrawal of the drug and the temporary relief obtained thereby can be so classed. An undergraduate medical student, with some brief training, can accomplish this quite as successfully as is usually done in the highest grade and most exclusively expensive sanatoria. If users of the type first mentioned are encountered, much good can accrue to well-executed treatment, but even in this class a "cure" should not be pronounced until many months following active treatment have elapsed, and even then most favorable cases ofttimes disappoint us.

Tongue-tie an Important Factor in the Bottle-fed Baby[1]

BY SAMUEL A. VISANSKA, PH.G., M.D.
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It is not my purpose to consider here the value of breast feeding versus bottle feeding for the infant, nor do I propose to enter into a discussion of the general ways and means which may be employed to encourage breast feeding and to discourage bottle feeding. All phases of these subjects have been covered in a general way many times and from many angles. But I do wish to bring to your attention one element which I have comparatively recently found to be a special factor in preventing normal breast feeding in a large enough number of cases to make it well worth while considering.

I confess that it is a source of regret, personally, that this special condition did not present itself to me earlier in my professional career, for I firmly believe it has existed in many more cases than the few which I have discovered. However, those few were of so positive a character that I feel impelled to ask you to consider "tongue-tie" as a factor in the bottle-fed baby.

Unfortunately a number of babies have come to me within the recent past who had already been weaned, and then, of course, my "discovery" was too late to benefit them, but it is not too late to help others of this class who might come to us now. In many of the recent cases in which the baby was plainly suffering from malnutrition and the mother's milk had irrevocably dried up, I found on examining the baby a thick, glistening, fibrous cord running across the base of the tongue, but not extending to the tip, which we might call a partial tongue-tie, and which would enable the child to only partly empty the breast. This is apart from complete tongue-tie, such as existed in a case which I shall refer to later, and which might have resulted in infant starvation had it not been remedied.

In cases of partial tongue-tie the history usually shows that the mother had plenty of milk at first, but noticed that the supply gradually gave out, despite the fact that she had consulted her physician from time to time and had been ordered by him to take various tonics coupled with a very liberal diet, which in some cases had proven to be "over" diet, resulting in digestive troubles.

This lack of milk resulted from only a partial tongue-tie, but I want to record one most interesting case which may well be taken as an example of what can easily result from complete tongue-tie.

Some months ago I was requested by the obstetrician who had officiated at the birth to take charge of Baby L., aged nine days, who did not thrive and who seemed abnormal, or rather subnormal, and who kept up almost continuous crying. It so happened that it was 9:30 P.M. when I reached the house and obtained the following history from the very intelligent obstetrical nurse: Mother, primipara; age, 30 years; milk came at usual time, but had practically disappeared; mother nervous from loss of sleep and hearing the baby's crying; nipples sore, breasts caked. Baby was taken into adjoining room for examination, and, because of the history given, the first thing I did was to look beneath the baby's tongue. I immediately saw what I more than half expected to see—a thin glistening membrane extending to the tip of the tongue and preventing the tongue being extended further than the gums. I sterilized my index finger and with a gentle sweep quickly removed this thin band. I ordered the baby placed at both breasts every two hours, so as to stimulate the secretion of the milk and empty what was formed, thus

[1]A paper read before the Section on Pediatrics, Southern Medical Association, Washington, D. C.

alleviating the caking in some measure. I then instructed the nurse how to care for the sore nipples and the caking and also as to the mother's diet. On my return the following morning, much to my delight the chart read: "Baby rested better; breasts showed some milk secretion." After two days I placed the baby on a two-and-a-half-hour schedule and a little later on a three-hour schedule during the day and twice at night—alternating the breasts. It was two or three days before scales were procured, but when we began to weigh the baby it made an unbelievable gain: Jan. 11, stripped, 5½ pounds; Jan. 13, 6 pounds; Jan. 18, 7 pounds; and so on, until before the end of the month the baby weighed 8 pounds and 10 ounces and continued to make a steady gain with no further trouble.

Because we may take this case as a representative one, I use it to base my findings as a whole. The three conditions I find here in the mother also exist in other similar cases—lack of milk secretion, caked breasts, and sore nipples; all of these are difficult and trying conditions to handle, and are much more easily prevented than cured.

Physiology teaches that in the act of sucking the lips are closed around the nipple; the *velum pendulum palati* is applied to the back of the tongue so as to close the buccal cavity posteriorly, and the tongue, acting as a piston, produces a virtual vacuum in the mouth by which liquids are drawn in with considerable force. Therefore, when the tongue is bound down with a fibrous band not only is the secretion of the milk interfered with, but the stripping or emptying of the breasts is impossible, and this stripping is most important in securing a normal milk supply. It is, in consequence, readily understood how a perfectly good breast may be utterly ruined by imperfect sucking, just as the udder of a cow is ruined by imperfect milking. It is to prevent this very condition that cows milked by machinery are finished by hand to insure thorough emptying of the milk ducts.

The sore nipples in the case reported, and doubtless in many similar cases, were caused by the infant making a frantic effort to obtain what nature intended for its sustenance, and as sucking was impossible it "gummed" the nipples, its upper and lower gums coming together with real force on the tender nipples, which were never designed for any such rough treatment. The results, therefore, of imperfect and improper nursing are most obvious.

Tongue-tie has not escaped the notice of medical writers. In looking over the literature procurable on the subject, however, I find some authorities refer to the condition, but do not seem to attach sufficient importance to relieving it.

Koplik says: "With a breast secreting sufficient milk tongue-tie would not prevent nursing." Rotch, however, says: "There can be no doubt that this condition which is called tongue-tie interferes somewhat with the process of sucking."

I claim that with a complete tongue-tie the breasts cannot be "stripped," and that, therefore, the secretion of milk will last only a few days. With a partial tongue-tie the milk will only be secreted normally for a short period and will be poor in quality and lacking in quantity.

The importance of a full milk supply in every mother for the sustenance of a normal baby being fully recognized by all medical men, even the mere possibility of tongue-tie interfering with this supply would make a consideration of this subject imperative. In my own experience I have demonstrated the influence of tongue-tie on the milk supply and on the consequent development of the infant, and I deem it the duty of every obstetrician and every midwife to examine the baby thoroughly soon after birth and to make a special point of looking for tongue-tie, and if found to relieve it at once. The softness and flexibility of the membrane at birth and for a few days thereafter make its removal the simplest possible matter, and then is the logical time for its removal. But, as has been said, it may be corrected

at any time, although, alas! if the discovery is made too late the possibility of breast feeding is removed.

The lack of such feeding is the most powerful menace to infant life which civilization faces to-day, and the time and place to battle the evil is here and now! I hope to see this Section of this great conference take a step forward for humanity in a concerted effort for the breast-fed baby, and as a means to that end a general examination at birth for a possible tonguetie must be made.

41 FOREST AVE.

Intestinal Toxemia

BY RUSSELL S. BOLES, M.D.
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For many years the cause of the symptoms arising in so-called autointoxication has been under discussion. To this day there has been no proof that any of the theories advanced is correct. That symptoms there are, and that these symptoms are more or less characteristic and occur fairly uniformly in different types of individuals, is well recognized. Their protean character is exemplified in the writings of Von Haller,[1] who thought that "fever, hemorrhage, consumption, and insanity are the inheritance of constipation." To-day many of us feel that headache, dizziness, anorexia, lack of physical and mental endurance, etc., commonly result from constipation; and some there are who would attribute arteriosclerosis, Bright's disease, cirrhosis of the liver, arthritis, neuritis, etc., to its ravages. Who knows but that all these proponents are correct? It is beyond dispute that some persons never suffer any obvious discomfort, and that their health apparently is in no way impaired by continuous and intractable constipation in the ordinary sense of the term. Others there are who are afflicted with distressing symptoms when they miss their customary evacuation by so little as a few hours. How can we reconcile these conflicting conditions?

At the present time the symptoms thought to arise in intestinal toxemia are explained by Alvarez[2] as being due to mechanical distention of and pressure on the intestinal mucosa by fecal masses, and as being reflex in origin. He cannot otherwise explain the rapid relief that follows cleansing the intestinal tract, and it does seem illogical from his reasoning to suppose that a systemic toxemia can be so readily eradicated. At the same time the patients who often present the least evidence of suffering from toxemia are those with dyschezia, fecoliths, and fecal impaction. The author has under treatment a boy with a fecolith in the sigmoid colon three inches in diameter, who is apparently enjoying perfect health and who was brought for treatment by his anxious parents because his bowels did not move for eight or ten days at a time except with an enema. Another patient is a woman thirty-four years old whose bowels have never moved for the past year even after the use of drastic cathartics, and who secures evacuation only by means of high colonic lavage; she suffers few of the commoner symptoms of intestinal toxemia.

The apparent good health in such patients may be due to the fact that they have developed an immunity to such toxins as are produced in their intestines, or that there may be differences of susceptibility to such toxins in different individuals, just as there are differences in susceptibility to the action of certain drugs such as quinine and alcohol. There also may have been no breaking down of their normal barriers of resistance to the intestinal toxins. We know, for instance, that the liver exerts a powerful detoxifying action on the toxins produced from excessive protein inges-

tion. Nencki and Pavlov have demonstrated this in experiments on dogs. By producing an Eck's fistula, which carries the products of digestion directly into the inferior vena cava and into the general circulation instead of through the liver, he found that dogs fed on a meat diet quickly died, but survived when only a minimum of protein was given.

I do not believe that the symptoms of intestinal toxemia are the result of a stasis in the lower bowel *per se,* as is revealed by the dry, hardened scyballous masses found there (and it is of course only the contents of the lower bowel that could exert any actual pressure on the intestinal wall because the intestinal contents are fluid down to the splenic flexure), but result from cecal and especially terminal ileal stasis. Stasis in the distal colon contributes to, if it does not entirely cause, stasis in the cecum and ileum, because we know that it produces active antiperistalsis in the proximal transverse colon with resulting regurgitation of the fluid contents of the cecum and transverse colon into the terminal ileum. This phenomenon, first described by Cannon, has recently been explained in detail by Case.[3] Absorption is very active in the ileum, slow in the colon. It takes place readily from the fluid contents of the ileum and is practically *nil* from the hard, dry contents of the colon. The absorption of toxins which have been regurgitated from the colon probably occurs in the terminal ileum and cecum. Such regurgitation is permitted by an incompetent ileocecal valve which, it has been determined, is present in many cases of intestinal stasis. If such a premise is correct, there is such a thing as autointoxication, and individuals do suffer from intestinal toxemia. The question immediately arises then, "What is the nature of the toxins absorbed that may be the cause of the symptoms?"

In answering I will first very briefly review the question of the intestinal flora. Kendall[4] says that the normal intestinal flora may be regarded as parasites just as the various bacteria which occur on the skin may be regarded as cutaneous parasites, and they give rise to endogenous infections when the barriers which ordinarily resist them are broken down. It would appear from most of the evidence at hand that the intestinal bacteria are inimical to health and that a sterile intestine is not incompatible with good health. Levin has observed that the feces of polar bears, for instance, are entirely sterile. The meconium of the fetus at birth is sterile, and bacteria first appear twenty-four hours after birth. In early infancy the breast-milk diet establishes a characteristic intestinal flora made up particularly of the group of aciduric bacteria, of which the Bacillus Bifidus and Bacillus Acidophilus comprise the majority of bacilli. Kendall further observes that the most important normal factor in determining the intestinal flora in health is the chemical composition of the ingested food. A preponderance of protein encourages the development of proteolytic bacteria which are putrefactive. Excessive ingestion of carbohydrate favors an overgrowth of aciduric bacteria of a fermentative or saccharobutyric type. Undoubtedly the greatest number of cases of intestinal toxemia are due to the indolic or putrefactive type of flora, which in turn are dependent upon the amount of protein ingested. And from a pathological standpoint the most important bacteriological action is that which takes place on protein. Now then, according to McLeod,[5] if bacterial growth is excessive or if there is an insufficiency of carbohydrate in the intestine, bacteria attack the amino-acids produced by the digestive enzymes and decompose them to products that may be toxic if absorbed into the blood. Therefore it would appear that the symptoms of intestinal toxemia are not due to mechanical causes as explained by Alvarez, but are probably due to the absorption of toxic products occurring in the large intestine, which are the result of chemical changes and bacterial decomposition.

Among the products that are probably

absorbed and act as the exciting factors in the causation of symptoms and production of disease, we have to consider the aromatic bodies, ptomaines, and gases, volatile fatty acids, etc. Amino-acids, which are the end products of digestion, are converted by bacterial action into such amins as tyramin, histamin, cadaverin, indol, etc. Some of these amins have been shown to possess definite physiological action. Tyramin raises blood-pressure; cadaverin lowers blood-pressure, produces nausea and vomiting; indol produces headache, vertigo, nausea, and vomiting; histamin lowers blood-pressure, produces bradycardia and diminution of salivary secretion.

Just how active bacterial decomposition is in the bowel we are unable to determine definitely, and until further chemical and biochemical study is made along these lines we will be at a loss to state with any degree of accuracy the relation and ratio between bacterial decomposition and intestinal toxemia.

SYMPTOMS.

The symptoms of intestinal toxemia are as diversified as they are numerous. It is possible that certain of the intestinal toxins may have an affinity for certain tissues. We may have in one individual gastrointestinal symptoms, in another nervous symptoms, in another mental symptoms, and so on.

Among the more pronounced general symptoms we find fatigue. This may be either mental or physical, or both. These patients are not capable of sustained physical or mental effort. Dizziness, headache (particularly occipital headache), tenseness and a sensation of pulling and drawing in the back of the neck, cold extremities, various paresthesias, are frequent symptoms.

Among the gastrointestinal symptoms may be mentioned anorexia, fickle and capricious appetite, fulness and distention after eating, and frequently ulcer-like symptoms. These gastrointestinal symptoms are probably due to disturbances of secretion, as it has been shown that hyperacidity or achylia may be the result of intestinal toxemia. Such disturbances of motility as atony of the stomach or the colon and pylorospasm and spastic colitis may occur. There can hardly be a doubt that many cases of appendicitis and cholecystitis, likewise, have their origin in a primary infection in the colon; and, as Norman[6] says, "the failure to recognize early the presence of intestinal foci of infection is responsible for an unnecessary number of cholecystectomies, cholecystotomies, appendectomies, hemorrhoidectomies, and the surgical correction for intestinal adhesions, sacculations, etc." There is ample evidence, especially from such workers as Cotton, Draper, and Norman, to support the belief that putrefactive conditions in the colon cause a destruction of the protective epithelium there, with consequent invasion of pyogenic organisms into the muscularis, into the intestinal glands and mesenteric lymphatics, with drainage to the liver, spleen, and pancreas, which causes a degeneration and fibrosis of these structures. Cultures of the mesenteric glands invariably show the presence of living colon bacilli or streptococci. Furthermore, it seems a very significant fact that carcinoma of the bowel occurs particularly where colonic stasis is usually found—*i.e.*, in the cecum and pelvic colon.

Anemia is invariably met with in intestinal toxemia. In the author's experience there is more frequently a diminution in the hemoglobin than in the number of the erythrocytes. Herter[7] notices changes in the morphology of the red cells characteristic of primary pernicious anemia in nine cases of infection of the intestinal tract with Bacillus Welchii. He also has made the interesting observation that carnivorous animals frequently suffer from pernicious and other forms of anemia, while herbivorous animals rarely have these diseases unless they are due to intestinal parasites.

Among the symptoms referable to the

nervous system we find such functional derangements as neurasthenia, melancholia, insomnia, lack of confidence, indecision, worry, introspection, migraine, and neuritis. Campbell has shown that toxemia may produce neuritis by causing nutritional changes in the neurones short of discoverable degeneration. Such mental conditions as dementia præcox, psycho-neuroses, and epilepsy, have been known to be cured by elimination of intestinal toxemia. Cotton[8] states, for instance: "Out of one hundred and twenty-five laparotomies among patients suffering with so-called functional psychoses, not one has been performed without demonstrating an intra-abdominal pathologic condition of unusual extent, and always of streptococcus or colon bacillus origin. This infection for the greater part enters the body cavity through the lymphatics, and the portal of entry has been in nine cases out of ten that segment of the bowel comprising the terminal ileum, cecum, and ascending colon. With this evidence from one hundred and twenty-five consecutive observations, is it not reasonable to believe that the physical conditions are in intimate relation with the mental status, and should not these unfortunate patients be studied and treated from every possible angle both by physicians and surgeons?"

Statistics at the New Jersey State Hospital at Trenton show that of three hundred and fifty-seven patients admitted during 1918-1919 classified as the functional group, including manic depressive insanity, toxic delirium, and dementia præcox, sixty-three per cent had been declared cured after the removal of focal infection. Of the number that remained, a large proportion, it was revealed, had definite intestinal lesions.

In another article Cotton goes so far as to assert that "if the intra-abdominal pathology of which the insane are very frequently victims was removed sufficiently early, many of them would never have been committed to institutions for the insane." Fixed delusions are not uncommon as a result of toxemia in pneumonia and typhoid fever, for instance, so why is it unreasonable to suppose that they might equally be caused by toxemias of intestinal origin. Lyon[9] feels that the demonstration of stasis permits a more intelligent speculation in regard to the absorption of toxins, chemical or bacterial, creating a picture of autotoxemia which may be behind the seemingly functional or so-called neurasthenic state of the patient. Stockton[10] says that "long continuance of infection of the digestive tract inducing a lowering of the general nutrition leads to depression or irritation of nerve tissue, and sometimes appears to be the exciting cause of brain disease and also an aid to its continuance." He believes that the character of the intestinal flora, particularly that of the colon, requires careful consideration. He notes that remarkable improvement follows in patients who are deprived of foods containing animal proteins, and also after deliberate attempts are made to change the intestinal flora, especially those concerned in the putrefaction of animal proteins and the incidental production of toxic substances.

Among the cutaneous manifestations, one encounters urticaria, acne, eczema, erythema nodosum, and erythema multiforme. The author has particularly noticed the association of some cases of dystrophia unguum with intestinal toxemia. In three cases he has seen a complete restoration of normal nails with the eradication of the intestinal toxemia. Brittleness and ridging of the nails commonly occurs. Characteristic blushing of the hypothenar eminences has likewise been observed by the author.

It is well recognized now that arthritis frequently develops from infection in the colon.

Ocular symptoms are quite common, particularly blurring of the vision, diplopia, and scotomata or black specks in the vision. Some cases of iritis, choroiditis, and corneal ulcer are known to improve with the eradication of intestinal toxemia.

DIAGNOSIS.

The diagnosis of intestinal toxemia is comparatively easy in the majority of cases. It entails, of course, a close analysis of the patient's symptoms and a careful physical examination as a means of eliminating organic disease as a cause of the symptoms. A careful *x*-ray examination of the gastrointestinal tract is always advisable, with special reference to the motility and position of the stomach and colon. I may mention here that changes in the position of the stomach and colon are probably of slight consequence. It is only when ptosis is associated with disturbances of motility that symptoms occur. Ileal and colonic stasis should be closely sought for, as should the presence of adhesions causing kinks, flexures, etc. Dilatation and catarrh of the cecum and ascending colon, and spasticity or atony of the transverse and descending colon, are often helpful in establishing a diagnosis.

Examination of the urine and feces after a test diet is, of course, of the utmost importance. The carmine test may be of some value in determining if there is stasis. Examination of the stools should grossly take into consideration the character and number of stools, consistency, reaction, odor, color, and shape. Blood and mucus should be carefully sought for, the color of the blood being noted, and the character in which the mucus occurs; whether it is intimately mixed with the stools, indicating catarrh high up, or whether it occurs in shreds or encases the stool as is frequently observed in mucous colitis. One should likewise look for food remnants and parasites. Microscopically, the routine examination should be made, and finally careful determination of the bacteria present, particularly the proportion of the gram-positive and gram-negative organisms, with the identification of each.

Aside from the routine urine examination, one should determine particularly the amount of indican present. Bassler lays great stress on the value of indol and acetic acid, in the estimation of solids and phosphates, quantitative estimation of sulphates, urea, uric acid, oxalic acid, ammonia, and bile pigments. The presence of indican in the urine in most cases indicates that there is an abnormal degree of intestinal putrefaction, and in general it is helpful in confirming a diagnosis. However, a close study of many cases reveals the fact that indican and the ethereal sulphates do not occur in the urine constantly, and the extent to which they occur does not necessarily bear any definite relation to the symptoms. Ury[11] found that there was diminution of indican in feces retained for three days in the bowel. The author has also observed that indican may be entirely absent in patients suffering distressingly from intestinal stasis. This may be explained by the fact that indol is probably formed in the lower part of the small intestine from the action of the colon bacillus on a relatively free carbohydrate medium, and to insure sufficient numbers of bacilli for this action the ileocecal valve must be incompetent. In such indican-free patients who have intestinal toxemia of the indolic type, we, therefore, attribute the absence of indican to a competent ileocecal valve. Norman claims to have clinical proof that this is true. The fact that the liver is entirely competent to destroy the indol must be also borne in mind. As a routine test, the determination of the presence of indican is of value and should always be done. The determination of the ethereal sulphates is the best single index of the degree of intestinal putrefaction, but it does not aid in determining the character of the putrefactive products. The presence of sugar in the urine may be the result entirely of intestinal toxemia. Eustis[12] says: "In the process of detoxicating aromatic poisons the liver utilizes sulphuric acid and acetic acid. In certain cases in which there is excessive absorption glucose is partially oxidized to glycuronates. Urines containing these combined glycuronates will reduce alkaline copper sulphate solutions."

TREATMENT.

As each principle of the treatment which I shall lay down could easily be made a

paper unto itself, I shall make no attempt to go into detail in consideration of these principles.

I shall first take up the subject of diet. The selection, handling, and preparation of all food ingested is most essential in preventing infection of the gastrointestinal tract. In selection of the diet, care must be exercised that it is particularly well balanced and contains a sufficiency of minerals and of such antirachitic, growth-promoting, and antiscorbutic vitamines as are found in fresh green vegetables, fresh fruits, milk, cream, butter, egg-yolk, bran, beans, beef and other fresh meats, cereals, etc. Cleanliness of the food is, of course, of the utmost importance, as is also proper cooking. Be it remembered, just for instance, that when meats are boiled, as much as twelve per cent of the protein, thirty-seven per cent of the fat, and sixty-seven per cent of the salts are found in the broth. When roasted, as much as four per cent of the protein, fifty-seven per cent of the fat, and fifty-seven per cent of the mineral matter are found in the drippings. Also in the cooking of vegetables, as much as fifty-eight per cent of the nitrogenous matter and thirty-eight per cent of the mineral matter is estimated to be lost from potatoes that are boiled without the skins.[13].

In the putrefactive or indolic form of toxemia it is very necessary to restrict such animal proteins as are found in meat, fish, eggs, and cheese, since they are much more readily decomposed than the vegetable proteins. Fruits and fresh green vegetables should be used abundantly. Well-cooked cereals served with milk-sugar, salads, whole wheat or Graham bread, olive oil, butter, and such plain desserts as gelatin and custard, are very beneficial. In the fermentative type of toxemia, a high protein diet is of value. At one time the beefsteak and water diet was very popular, and chiefly so because it resulted in great benefit to these particular cases. Meats (especially beef, lamb, chicken) and also fish and eggs are particularly indicated. Highly refined foods even in health should be prohibited on general principles. The whiter the flour and the whiter the sugar the less the vitamin content.

The bacterial treatment of intestinal toxemia began, we might say, following the recommendation by Metchnikoff of the Bacillus Bulgaricus. Since that time cultures of Bacillus Bulgaricus, and, of late, of the Bacillus Acidophilus, have been widely exploited.

Substantial clinical evidence has been gathered to justify the use of certain of these preparations. Although the Bacillus Bulgaricus is an active producer of lactic acid, it cannot be successfully implanted in the intestines, and it has given way for this reason to the Bacillus Acidophilus. Rettger, Cheplin,[13] and others have shown that the Bacillus Acidophilus forms lactic acid readily and that it can accommodate itself to intestinal conditions. To accomplish this, however, living cultures must be used, and it is preferable to administer such special diets as favor this transformation. It has been shown that 1000 cc of active milk culture of the Bacillus Acidophilus will effect a transformation of the intestinal flora in a few days, and the same effect may be secured by giving one-half the amount of culture reënforced with one hundred grammes of lactose. In certain diarrheas, and in many cases of stasis with resulting toxemia, decided improvement may be expected from the administration of acidophilus milk. The various tablets of Bacillus Bulgaricus and Bacillus Acidophilus are of necessity valueless owing to the small numbers of bacilli that can be taken in this form. The same objection holds in the use of other than milk cultures.

When definite and especially severe symptoms of intestinal toxemia exist, Bassler believes the exciting infection is present in the mucosa rather than in the intestinal contents, and for this reason he has elaborated a form of vaccine treatment in which he injects into the rectum viable, non-toxic strains of the infecting organism. He claims excellent results in two thousand cases so treated. Although my experience

in the treatment of cases according to Bassler's technique has been very limited, the results have been quite gratifying. Norman uses autogenous vaccines prepared from cultures of the fecal content during drainage, combined with cultures taken from such foci of infection as may be found in the teeth, tonsils, etc.

Colonic irrigation, I believe, is a valuable adjunct in most cases when properly carried out. From an extensive experience with the use of colonic irrigations, I am firmly convinced they are very helpful in relieving stasis and symptoms resulting therefrom. I will briefly describe what I consider a satisfactory technique. The patient is instructed to secure a movement before coming for irrigation by taking mineral oil or a mild laxative the night before. He is placed in a Sims position on an unyielding table. A six-inch metal rectal tube is inserted just inside the sphincter. The use of rubber tubes, long colon tubes, two-way tubes, etc., has been found unsatisfactory and they have been discarded. From a three-gallon irrigation jar, suspended eighteen inches above the table, the solution is allowed to run slowly into the rectum in amounts varying from one to two pints. By means of a glass T connecting-tube the inflow is then stopped and the solution allowed to drain off. This procedure is continued until the drainage returns clear, which usually takes from three to six gallons of solution. Ordinary tap water may be used in most cases, although, depending on the conditions present, normal saline, bicarbonate of soda, and various medicated solutions may be indicated. The temperature of the solution may have to be varied. In spastic types of colitis, solutions at 108° or 110° are helpful, while in atonic cases cooler solutions at 90° to 100° Fahrenheit are used. Modifications of the treatment such as changes in position, amount and temperature of the solution used, etc., may of course have to be employed to suit individual cases. Abdominal massage facilitates drainage and is usually given before and after treatment. The use of the faradic current as applied by means of the Morse Wave Generator, following the treatment, appears to be of value. I have yet to see any ill results following the use of a skilfully given colonic irrigation.

When ileal stasis is pronounced transduodenal lavage is efficacious.

Of medicines, intestinal antiseptics claim our first attention. As a result of the evidence secured by many able investigators such as Bouchard, Bauman, Sucksdorff, Schmidt and others, it appears well established that practically all so-called intestinal antiseptics are ineffective in securing any real antisepsis in the intestine. Betanaphthol and creosote probably exert an antiseptic and beneficial influence if their absorption is delayed until they reach the colon by administering them in an enteric-coated tablet. Dimol seems to have some value as an intestinal antiseptic. Water in large quantities taken between meals has been shown to diminish decidedly the number of bacteria in the feces. Such general tonics as iron, strychnine, arsenic, and the glycerophosphates are of course valuable when indicated. Of laxatives there are only two that should ever be routinely used, *i. e.*, agar-agar and mineral oil. Agar-agar is best given in tablespoonful doses of the granular form, once or twice a day with meals. A pure mineral oil of high viscosity given in tablespoonful doses two and three times a day is of distinct service. The use of any other laxatives, except for an emergency or temporarily in intractable non-surgical cases of stasis, is unwarranted.

Corrective measures, such as proper posture, abdominal exercises, and outdoor exercise, are obviously important aids in securing good results. I would like to emphasize the effectiveness of deep breathing for its beneficial effect on the colon. When stasis is associated with ptosis, the application of properly fitting belts or corsets is necessary. For temporary use I often employ the Rose moleskin belt. In any case, detailed instructions in the adjustment of the corset should always be given the patient.

My object in presenting this paper is sim-

ply to summon fresh attention to this subject of intestinal toxemia which I believe confronts us all each working day.

SUMMARY.

1. Intestinal toxemia can reasonably be presumed to exist in most individuals suffering from intestinal stasis.

2. The toxemia appears to be due to the absorption in the terminal ileum and cecum of toxic products, which are the result of chemical changes and bacterial decomposition.

3. The symptoms of intestinal toxemia may be general or localized—*i.e.*, gastrointestinal, nervous, ocular, cutaneous, mental, etc.

4. Such pathological conditions as cholecystitis, appendicitis, adhesions, and anemia, are frequently secondary to intestinal infection. Indifference to this fact explains why such operations as appendectomy, cholecystectomy, etc., often fail to relieve a patient of symptoms for which the operation was undertaken.

5. The diagnosis may be made from a careful analysis of the patient's symptoms and a thorough physical examination to the end that organic disease may be excluded. Examination of the urine and feces and *x*-ray examination of the gastrointestinal tract is desirable in all cases.

6. In the treatment, consideration of the diet is of great value. In the indolic type, which is by far the most frequent, a low protein and high carbohydrate diet is indicated. In the saccharobutyric type the reverse is necessary.

7. Bacterial treatment is efficacious in many cases. Milk cultures of the Bacillus Acidophilus appear to be beneficial. Subcutaneous or rectal injections of the vaccine indicated promise relief in selected cases.

8. Colonic irrigation materially aids in relieving stasis and its resulting symptoms. When skilfully carried out, no ill results follow its use and pronounced benefit is secured.

9. Agar-agar and mineral oil are exceedingly helpful, and laxatives are contraindicated. Such corrective measures as outdoor exercise, proper posture, and well adjusted belts or corsets are important aids in attaining a cure.

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Treatment of Pneumonia.

BROADBENT, in the *Lancet* of January 5, 1924, states that in the treatment of pneumonia it is most important that the patient should be kept as quiet as possible, since autoinoculation takes place on any movement.

Nurses should be told that washing must be limited to a minimum. Many years ago in a case of pneumonia he had the patient's temperature taken just before the morning's elaborate ablutions, and again half an hour after their completion, and there was a rise of nearly a degree, with very distinct malaise. On the next morning the temperature was taken at the same times without

any washing of the patient, and no rise was shown. Sponging without moving is comforting and good.

For the same reason examination by the doctor should be as little disturbing as possible; percussion should be very light. After the diagnosis has been made, it is unnecessary to listen to the backs unless there are signs of fluid. The chest should be examined as far back as the posterior axillary lines without moving the patient, and, as long as crepitations and breath sounds are heard there, no serious amount of fluid can have accumulated. In the old-fashioned lobar pneumonia, with constant temperature between 104° and 105°, a large ice-bag continuously applied over the site of the pneumonia undoubtedly does good. In other cases antiphlogistine is beneficial, or, if there is much pain from pleurisy, this may be preceded by a linseed and mustard poultice.

As to specific treatment, a vaccine, if of the right type of pneumococcus and the correct combination of germs, may be very useful, if given early in the disease; but it is not safe in the very poisoned cases with low temperatures, as the negative phase may be too much for the patient. [We are in accord with this latter view.—Ed.] After the second day vaccines are not likely to be useful, since pneumococci are then usually circulating in the blood, and, if live pneumococci going through the glands will not produce antitoxin, it is unlikely that dead ones will. In delayed resolution, when the physical signs are not clearing a week after the subsidence of the disease, autogenous vaccines are of great assistance, also after operation for empyema they hasten the cure.

Many years ago he was told of the merits of Pane's antipneumococcic serum by the senior physician of Frankfort Hospital. Up to 1917 it was the most valuable remedy, but in the influenza epidemic of the autumn and winter of 1918 it was apparently useless, as also were the English and American serums; but the Pasteur Institute in Paris had prepared a serum by inoculating horses with all the germs of the spring epidemic of 1918, and the results of its use were marvelously good. Twenty cubic centimeters, repeated in from twelve to twenty-four hours, is usually sufficient, but a third injection may be necessary. Pane has since then followed the lines of the Pasteur Institute, and his serum is now quite effective.

Medicinally, aspirin, first recommended by Dr. Alfred Scott, is undoubtedly valuable, but the doses should not be too large. He once saw in consultation a girl who, just after the crisis, with normal temperature, was suffering from intense dyspnea. There were no signs of fluid in the chest, and the dyspnea reminded one of the air-hunger of diabetes. He found that she had been given large doses of aspirin, and concluded that it was a case of acidosis. Bicarbonate of soda by the mouth and rectum stopped the dyspnea in a few hours, and the child made a normal recovery.

Quinine, given with aspirin, is also helpful, and this especially in post-influenzal cases. He has had good results with the creosote and iodide mixture, but patients dislike it. Ipecac and iodide may be useful in loosening expectoration. Oxygen should always be kept ready. As a sedative at night Dover's powder is one of the best. In cases of intense poisoning Warburg's tincture is very valuable given by mouth or rectum, as, besides being a bactericide, it is a strong stimulant. It must be given in an alcoholic solution, such as port wine, since water precipitates the resins and destroys its efficacy. Hyperpyrexia should be treated by ice sponging or packing, and by large doses of Warburg's tincture.

It is very important to watch the heart. In the early stages of lobar pneumonia, if there are signs of overdistention of the right side of the heart, such as duskiness of the face, and marked epigastric pulsation, six leeches over the site of the pneumonia will have a good effect. If the pulse-rate is above 100 digitalis should be given regularly, but not in very large doses, and if up to 120 hypodermic strophanthin. Camphor hypodermically is also very useful.

Editorial

MORPHINE IN CASES OF CARDIAC DYSPNEA.

That the hypodermic administration of morphine gives wonderful relief, which cannot be obtained by the use of any other drug, in cases of cardiac dyspnea is certainly well recognized by many practitioners in this country, and we, therefore, read with surprise a communication made by Wilson to the London *Lancet* in which he states that in an extensive search throughout the literature of the subject he has failed to find that its value is generally recognized. Not only is this drug of great value in some cases of cardiac dyspnea, but also in some instances of renal dyspnea, although in the latter condition we have more than once seen better results obtained from the hypodermic use of non-emetic doses of apomorphine.

It goes without saying that morphine is not to be used for the relief of cardiac dyspnea which comes on under effort, but rather for that which comes on in paroxysms, and particularly that which is nocturnal and interferes sadly with sleep and rest. Its use, through the hypodermic needle, is indicated because in many of these cases engorgement of the liver results in a condition of the stomach which makes absorption through this viscus exceedingly slow. Under certain circumstances we think it may be truthfully stated that morphine gives relief in excess of that which can be obtained by the use of digitalis; first, because its influence is almost immediate, and secondly, because it induces comfort and puts aside what amounts to torture.

Wilson in his paper speaks of its employment in the presence of Cheyne-Stokes respiration and believes that it is a valuable drug under these circumstances, often not only relieving the patient of his immediate difficulties, but sometimes producing a condition in which these manifestations do not recur for long periods of time, if at all. Of course, we are referring to the Cheyne-Stokes type of breathing which depends upon cardiac failure and not upon a cerebral lesion.

A point in connection with this matter of administering morphine in severe cardiac disease is the remembrance that in such cases death may occur while the patient is under the influence of the drug. If so, the patient dies easily instead of in the midst of suffering, but, as a matter of diplomacy, the recognition of this possibility should lead the physician to state to the friends of the patient that death may occur at any time with or without morphine, that it is less apt to occur if the morphine is given than if it is not. If it does occur, they must bear in mind that the morphine has not been responsible for the demise, as otherwise friends of the patient may think that the physician has been guilty of some error in judgment.

Needless to say, in the dyspena, or sense of difficult breathing, which is met with in cases of angina pectoris, morphine is as valuable a remedy as it is in the other types which we have discussed.

SO-CALLED BLACK-WATER FEVER.

We have more than once stated that it was our belief that ultimately it would be found that while black-water fever, so-called, is practically always associated with malarial infection, in a certain proportion of cases at least this alarming symptom is due to some associated parasite, or cause, which has not been discovered. Those who have read the THERAPEUTIC GAZETTE for many years will recall that some thirty years ago a collective investigation published in its columns showed a wide divergence of view as to whether quinine was useful or harmful in the presence of malarial hemoglobinuria or malarial hematuria, but that a greater number thought

it of value than those who thought it had evil influence.

Recently the London *Lancet* has called attention to an investigation made by Thomson, Director of Protozoölogy in the London School of Tropical Medicine, who made two visits to Rhodesia in 1922 and 1923 to study hemoglobinuric fever. After pointing out that various organisms, protozoa, and bacteria have been claimed to have been found in such blood only to be cast aside later on because further research proved that they did not exist, Thomson points out that black-water fever develops as a result of repeated attacks of malignant tertian malarial infection and that the various and many motile filaments seen under the microscope in such cases are not protozoa but are artefacts. Therefore, the conclusion is reached that spirochetes are not responsible for this condition and that the malignant tertian parasite is the convict. These conclusions were reached after studying fifteen cases of black-water fever at different stages of the disease. They are of importance, but not conclusive.

The practical point, however, is as to whether quinine should or should not be used in the presence of this complication. There is much evidence that quinine may induce hemoglobinuria, but if Thomson's researches and conclusions are correct, manifestly it is the duty of the physician to combat the infection, and at the present time nothing is known which is better than the alkaloid of cinchona.

THE TREATMENT OF MELÆNA NEONATORUM.

This condition, which a few years ago was regarded as an exceedingly grave one because the mortality varied from 40 to 80 per cent, has been well met from the therapeutic standpoint by the discovery that comparatively small quantities of blood or blood serum injected subcutaneously were capable of causing its arrest. We have seen more than one case in which whole blood, or hemostatic serum, injected into the loose tissues has produced a most excellent result.

Recently a paper has appeared by Rochat, of Lausanne, calling attention to the results which he has achieved. Using a 10-cc syringe he injects 3 cc of blood aspirated from a vein in the mother's arm into each of the infant's buttocks before the blood has had time to coagulate in the syringe; repeating these injections several times during the first day, it being considered that the mother's blood belongs to the same group as that of the child.

THE EFFECT OF SODIUM CITRATE ON THE BLOOD.

For a number of years the method of indirect blood transfusion has been largely practiced and has been highly lauded by many of those who have employed it, although it has been claimed with equal emphasis by others that direct transfusion much less frequently leads to a sharp reaction, and, furthermore, that however valuable the indirect method may be to replace blood which has been lost by operation or by traumatism, that for the combating of sepsis and the grave forms of anemia, which conditions, in one sense, are chronic rather than acute, whole blood is greatly to be preferred.

The employment of citrate of sodium to permit of the successful transfusion of blood by the indirect method depends, of course, upon the fact that the addition of a very small quantity of this substance has been shown to greatly diminish coagulation time, and, because of this, it was possible to let many hours elapse, if necessary, between the time of the withdrawal from the donor and the gift to the donee.

We wish to call attention in this editorial note to a research by Rosenthal and Baehr, which is of very considerable interest from several points of view. The first of these indicates the danger of reaching definite conclusions in regard to the action of medicinal substances until very thorough investigations have been made of their

effects under different circumstances. This is illustrated by the fact, which seems to be proved by these investigators, that the influence of sodium citrate when administered intravenously in full doses produces a pronounced and progressive shortening in coagulation time, which reaches its maximum within one hour and may continue for many hours, after which the coagulation time gradually goes back to normal by the end of one full day.

It will be perceived that this is the direct contradiction to the action of sodium citrate in the coagulation of blood *in vitro*, and Rosenthal and Baehr believe that this variation in result is dependent upon some effect on the blood platelets, which are not, they think, directly damaged by the citrate, but indirectly are damaged, and then taken from the circulation to the spleen or liver, where their destruction results in setting free their thromboplastic contents into the general circulation. In the test tube sodium citrate does not destroy the platelets, rather tending to preserve them, but when injected into the blood stream they rapidly diminish in number, so that in the cat, for example, the diminution amounted to between 85 and 90 per cent within ten to fifteen minutes, with a corresponding setting free in prompt fashion of the thromboplastic substance.

The second noteworthy point is the discovery by these investigators that a shortening of coagulation time after the intravenous injection of sodium citrate does not occur in human beings suffering from hemorrhagic blood diseases, which conditions are characterized by marked deficiency in the blood platelets as to numbers. Thus, in congenital hemophilia, in which condition there is thought to be a deficiency in the quantity of blood platelets, the injection of sodium citrate greatly prolongs coagulation time. For this and other reasons these authors believe that in such diseases the use of citrated blood is strongly contraindicated. Thus they found that in purpura hemorrhagica there was also a marked prolongation of clotting time. These authors also warn against the rapid injection of citrated blood, insist that the solution shall be well diluted, and that at least fifteen minutes should be consumed for the process of injection. They also advise that the quantity does not exceed from 200 to 500 cc of blood.

CHRONIC ARTHRITIS.

When a patient consults his doctor for a joint or joints which are painful, and remittently or persistently so with exacerbations, the usual procedure on the part of the professional man is to make an examination as to range of motion, presence or absence of atrophy, seat and radiations of pain, and palpable or visible deformity. Thereafter there is a somewhat casual inspection of the teeth and gums, one equally incidental of the tonsils and throat, a questioning as to the appetite, the presence or absence of indigestion and of constipation; auscultation and percussion of the heart, estimation of the blood-pressure and heart-rate whilst the patient is quiescent and after prescribed exercise; a test is made of the knee-jerk, the reflexes and station; a specimen of the urine is collected for the laboratory, and the patient is told, if nothing markedly abnormal be found by this examination, that he is suffering from rheumatism, that he eats too much food if he be fat, or too little if he be thin, and drinks too little water. He is given a salicylate or other similar medicine, is ordered a counter-irritant to his painful joint or joints, and is sent home.

If the doctor be of the more modern type this patient, instead of being sent home, is referred to the *x*-ray department, from which come pictures showing beginning or well-advanced overgrowth or degenerative changes, or nothing at all. If this patient has not previously been to a dentist he will be sent to one and may have one or more, at times all, of his teeth extracted, the dentist in turn taking first a series of *x*-ray pictures of the teeth and their roots, and deriving, as a rule, from these pictures positive evidence of at least one focus, usually many foci, of chronic infection. If the tonsils happen to be enlarged the pa-

tient is sent to a throat specialist, who finds crypts and follicles filled with pus, cultures from which show streptococcus viridans, staphylococcus, and numerous other organisms. In addition the specialist will find and point out to his patient a telltale node at the angle of the jaw palpable from the outside and of real diagnostic value, and will advise a complete tonsillectomy. It is quite true that such procedure is at times indicated even in the absence of enlarged tonsils, and indeed some little tonsils with suppurating crypts and telltale nodes are more damaging to the general health than those of much greater size. Incidentally the throat specialist may find chronic sinus trouble, requiring one or many surgical procedures practiced on the nose.

Should the laboratory report of the examination of the urine be returned with the finding of mucus and pus, the patient will be referred to the genito-urinary specialist, who will probably find chronic inflammation of the prostate or seminal vesicles and institute proceedings for its relief, usually massage and irrigation. Sometimes the procedure is much more radical. The rheumatic patient after having his teeth drawn, his tonsils removed, his sinuses thoroughly drained, his turbinates trimmed down, and the urethra systematically treated, with, incidentally, the removal of hemorrhoidal tabs discovered on rectal examination, should his rheumatism still persist, is then subjected to a careful gastrointestinal study in which earnest efforts will be made to implicate the gall-bladder, the appendix, the stomach and duodenum, and the cecum. Tenderness in the right iliac fossa or over the gall-bladder, associated with constipation and dyspeptic symptoms, may be regarded as adequate cause for an exploration, which may, indeed often does, reveal a chronically inflamed appendix and a thickened gall-bladder. Even after these have been removed, the patient is not always cured of these rheumatic pains for which he first consulted his doctor.

This represents the line of conduct on the part of physicians, and a trust in their judgment on the part of patients which is by no means exceptional. It is indicative of the belief of the profession in the doctrine that osteoarthritic changes, aside from those due to either sudden and violent or frequently repeated slight trauma, are as a rule incident to infection, and that chronic and persistent bone changes in joints indicate chronic and persistent focal infections which may be of minor moment in themselves. That the ablation of these persistent locally symptomless infections stops the pathological process in the joint has been proven by clinical experience. Hence every effort should be made to discover such foci. Since the usual sources of such infection are the teeth and tonsils they should be first subject to scrutiny. Though they are doubtless sacrificed many times when they are not really at fault, attention directed to them is occasionally of almost magical effect in so far as the benefit accruing to the health of the patient is concerned.

Lane has many times urged the profession to more closely ascertain the condition of the intestinal tract, since he regards stasis in this portion of the alimentary canal as causative of nearly all of the ills to which flesh is subject and particularly of arthritic changes.

Smith by *x*-ray and clinical study is convinced of the important rôle played in the etiology of arthritis by intestinal stasis. Many internists and surgeons have, as a result of observation, come to the conclusion that from the intestinal tract, and particularly the lower part of the ileum and the cecum, are absorbed these toxins or forms of infection which most frequently cause arthritic changes and other health derangements.

Fuller's remarkable paper published many years ago has shown us how largely serviceable in producing arrest or cure of cases apparently hopelessly crippled may be the finding and elimination of the chronically infected seminal vesicle.

There is a growing belief to the effect that not only arthritic changes, but those which produce the impaired peripheral circulation and increased burden upon the heart incident to arterial sclerosis, are in many if not all cases traceable to an infec-

tion which may in the beginning be diffuse and so remain, as in syphilis; or which may be focal and persistent, and may by its toxic products produce those scleroses which are indicative of a reaction against an irritant or a strain.

In the search for a focus the fact that there may be more than one is often forgotten, and in the attention attracted by the dentists, the throat and nose men, and the genito-urinary experts, because of their skill and success in finding that for which they seek, it is often forgotten that the intestinal tract may be, and probably is, a commoner source of impaired health and function from absorption of deleterious substances than is any other disordered part of the body.

RADIOTHERAPY.

The more intensive study of the physics of radium, particularly by Duane, and the larger clinical experience has enabled the profession to decide more wisely as to how and when it shall be applied, as to what results may be expected, especially in the treatment of malignant affections. Moreover, the preparation and dissemination of radium emanations, for which the name radon is employed, have made treatment by this physical force much more widely applicable. This is incident to the fact that, though it loses 50 per cent of its initial radioactivity in a little short of four days and 80 per cent in something short of eight days, the rapidity of decay is uniform, and thus radon can be prepared the mean of activity of which after twenty-four hours would be exactly equivalent to that of a radium salt preparation of given strength. Since it is in a gaseous form radon can be compressed, and a curie can be contained in the space of 0.58 cc. The monetary value of the radium applicator is trifling, hence if one be lost it is a matter of little moment.

In the *Lancet* of February 23, 1924, there is an excellent abstract of the annual report of the Radium Institute of London of December 3, 1923. In this it is stated that collaboration of the surgeon is often needful for the proper application of radium or radon. Thus in the treatment of largyngeal growths subhyoid pharyngotomy may be necessary; or in inoperable cancer of the uterus with extensive infiltration of the broad ligament a laparotomy will be called for that the radium tubes may be buried from the peritoneal surface. The surgeon has been called upon to perform gastrostomy to enable proper application of radium tubes to cancer at the cardiac end of the esophagus.

The report is highly commendatory of the results obtained by the combination of diathermy with radium, especially in treatment of carcinoma of the tongue, tonsils, mouth, and fauces; even advanced cases being greatly helped by the relief of pain and retardation or arrest of the progress of infiltration. Diathermy is used to accomplish removal or destruction of the primary focus involved, lymph glands are excised, and thereafter there is general radiation of the whole operative area by means of radium tubes and applicators.

It is stated that with experience and clinical study there is a tendency toward larger doses, especially at the first treatment, varying from 250 to 750 mgms. with screening of 2 mm. of lead and exposure of 20 to 30 hours duration, this being used for such conditions as extensive mammary cancer, mediastinal growths, lymposarcoma, lymphadenoma, and lymphatic leukemia. Such large doses are not considered advisable in radiations applied to the abdominal cavity, as recent experimental researches have shown that the mucus-forming cells of the intestines are especially susceptible to gamma rays.

The results of treatment have not been satisfactory when applied to simple goitres, nor should it replace surgery, excepting when there are good reasons as to why the latter is not applicable. The results are often satisfactory, sometimes surprising, in malignant goitre. As in the thymus gland "cross-fire" radiation with flat applicators containing 50 to 100 mg. radium element screened with 2 mm. of lead and continued for from fifteen to twenty hours'

duration, given in three or four equal periods on successive days, causes rapid shrinkage. The second treatment is rarely needful. Chronically enlarged spleen due to congestion incident to hepatic cirrhosis, or cardiac and pulmonary affections, or syphilis, rickets, malaria, or lardaceous disease, are not benefited by radium therapy. It will, however, accomplish much, causing rapid shrinkage in the size of the organ and improvement of the general health if applied to the enlargement incident to simple splenomegaly and splenomedullary leukemia.

As bearing on tuberculous adenitis, it has been shown that long exposures of such length and strength as to kill the investing tissues are needful to kill the bacilli. Weaker exposures, though not causing the death of the microörganisms, produce a marked lowering of vitality as shown by subcultures. Hence radiation of tuberculous glands is not without its value. Moreover, it produces a sclerosis in itself helpful.

Lymphadenoma responds promptly. This is especially true when this affection involves only the superficial glands. The results in lymphosarcomata are almost magical. Degeneration occurs so rapidly with consequent absorption that there is often pronounced systemic disturbance. As to the benefit accruing to the blood in leukemia the lymphocyte seems to be the most susceptible of all cells to radium. Hence, under treatment there is a rapid decrease in the total number and percentage of these cells, with associated improvement in general symptoms. This betterment may persist for over a year. As a rule there is a relapse in half this time and treatment must be repeated.

In lymph nodes radium is valuable in supplementing surgery as it deals with malignant lymph nodes. After total removal, screen radiation over a wide area is helpful since it may and probably does destroy infected foci and blocks lymphatics. When surgery is not possible radiation will often produce distinct betterment of the glandular involvement and slowing or arrest of diffusion. Buried radium tubes are advisable when they can be applied.

Progress in Therapeutics

Medical Therapeutics

Pituitrin in Tympanitis.

Cross, in the *British Medical Journal* of January 5, 1924, states that a slight distention of the intestines with gas is an almost constant occurrence after abdominal operations; it should begin to pass off in twelve to fifteen hours. When true ileus develops distention and discomfort steadily increase. The condition is a vicious circle, for the atony permits both stasis of fecal matter, which in putrefying causes further paralysis of the gut, and formation of gas, which increases the distention.

The dangers are readily apparent: (1) Organisms may penetrate the devitalized viscera and a fatal peritonitis occur. (2) Acute postoperative dilatation of the stomach may cause intractable vomiting and death from inanition and heart failure. (3) Kinking of the distended intestine may change the condition to mechanical intestinal obstruction. (4) Great distention may embarrass the diaphragm and impede the heart action.

More theoretical causes of death are: (*a*) Absorption via the lymphatics of a bacterial toxin found in the putrefying fecal matter. (*b*) Splanchnic blood stasis, causing anemia of the vital brain centers. (*c*) Irritation of the nerve endings in the intestinal wall, which causes death by constant reflex stimulation of the central nervous

system. (*d*) The more recent work of Whipple and Stone suggests that the toxic symptoms are caused by the absorption by the blood stream of a toxin in the nature of a proteose which is secreted in the affected intestine.

It cannot be denied that the present treatment of severe ileus is not all that could be desired; the condition is much feared by surgeons. Methods past and present are:

1. Massage of the abdomen. This is not enjoyed by the patient, nor is it ideal over a large wound.

2. Thrusting a trocar and cannula through the abdominal wall. This temporarily relieves one loop of bowel and infects the abdominal wall. It is not a scientific method.

3. Passage of a lighted taper on the cautery downward along the colon, in the assumption that the heat would start peristalsis.

4. Temporary colostomy or enterostomy, hoping that if the gas and fecal contents escape peristalsis will be reëstablished. In practice, however, the loss of tone prohibits the emptying of the intestines.

5. For acute postoperative dilatation of the stomach, washing out the stomach is certainly the best treatment. For atony of the intestines a stiff-walled rubber tube may be passed high up in the rectum and left *in situ* for several hours to permit the escape of flatus. High enemata of different kinds—soap, olive oil, turpentine and asafetida, etc.—are of the utmost value.

6. Drugs acting from within. In ileus carminative and purgative drugs are disappointing.

7. Drugs acting from without.

(*a*) Physostigmine. For many years it has been known that physostigmine (eserine) has the power to augment the movements of the alimentary canal by stimulating the parasympathetic nerve ends. One of the first surgeons to use physostigmine as a remedy for postoperative ileus was Craig. Its value in this connection was scientifically estimated by Cannon and Murphy, who found, however, that the contractions it caused were short-lived. A few years later Moennighoff even went so far as to recommend physostigmine in laparotomies as a prophylactic against distention, giving gr. 1/40 as a routine immediately the patient returned to bed. The other drug of great value is—

(*b*) Pituitrin. The work of Dale proved scientifically the action of pituitrin: "The action of extracts of the posterior lobe of the pituitary body is a direct stimulation of involuntary muscle, without any relation to innervation. The action is most nearly allied to that of the digitalis series, but the effect on the heart is in this case slight, that on plain muscle intense." It was then clinically investigated by Bidwell. This surgeon used pituitrin in a series of twenty-one cases of postoperative ileus. He found it of value, but concluded that it could not be completely relied upon and should be used in conjunction with enemata.

At a meeting of the Association of Provincial Surgeons held at Oxford in 1914 Gunn pointed out that in experiments on the intestines of laboratory animals there appeared to be a genuine synergism between pituitrin and physostigmine, evidenced by the fact that smaller doses of these substances in combination produced more pronounced stimulatory effect on the intestinal movements than could be produced by much larger doses of either of them singly; and he suggested that, in the treatment of postoperative ileus, a combination of pituitrin and physostigmine would probably be more efficacious than either alone. Since then at various times this combination has been tried at the Radcliffe Infirmary with good results, but no systematic attempt had been made to decide its value. Gunn suggested to Cross that he should investigate this problem in the laboratory, using the technique employed by Gunn and Whitelocke for the isolated human appendix, and the present paper contains a summary of the results thus obtained as well as a record of a series of clinical cases in which the treatment was adopted during a period of six months. The largest majority of cases of slight postoperative distention yielded to enemata. A certain number were more

stubborn and required either pituitrin or physostigmine. The remainder were severe cases of ileus which did not improve with either drug separately. The combination was then used.

Treatment of Acne Vulgaris.

In the *British Medical Journal* of January 26, 1924, SCOTT states that acne vulgaris is unfortunately still considered by a good many medical men as a disease very little influenced by treatment and which must run a long and protracted course. This is to be deplored, because cases should be treated early to avoid marked scarring; even in chronic cases most of the signs of the disease can be removed within a month under a form of treatment which requires very little alteration in different cases.

Pure cases of acne vulgaris are practically non-existent; they present a mixture of comedones and pustules; in some the acne bacillus predominates and there are more comedones, in others the *staphylococcus epidermidis albus* is more abundant and more pustules are present.

He has not found that dieting exerts much influence on the disease, except in the cases of young girls, who seem to feed on sweets and chocolates to the exclusion of almost any other food; but, generally speaking, excess of carbohydrates in the diet is bad; fruit and green vegetables are good.

The patients should be ordered enough of the following powder during the day or at bedtime to insure two good motions a day: pulv. rhei 2 to 5 grains, pulv. sulph. precip. 30 grains. To this powder may be added sodium bicarbonate, bismuth carbonate, or charcoal if necessary. Rhubarb, as pointed out by Sabouraud, seems to have a specially beneficial action in acne.

The parts affected by acne should be cleared of all grease with a mixture of ether and alcohol, equal parts, then steamed, and the most conspicuous comedones extracted with a comedo extractor and the larger pustules opened with a fine tenotome and the pus evacuated.

The patient should be ordered three warm baths a week of twenty minutes each, in which should be dissolved 15 to 30 grams of zinc sulphate, according to the tolerance of his skin, and he should dab his face with the water while in the bath. In addition he should apply the following lotion to the affected parts night and morning: sulph. precip. 2 to 5 dr., zinc oxidi 2 dr., pulv. camph. 20 grains, pulv. tragacanth. ½ dr., aqua calcis ad 8 oz. The sulphur should be increased according to the tolerance of the skin, with a break occasionally if necessary; the patient may also with advantage use sulphur soap for his toilet.

This treatment, which is really extremely simple, will in less than a month completely transform the worst type of case of acne vulgaris, and if the doctor looking after the case will take the trouble to remove a few comedones and to open a few deep pustules whenever he sees the patient, he will find that 95 per cent of all the lesions have gone in less than a month and that new ones are no longer appearing. In addition most of what is left of the disease at this stage can be dealt with by the electrocautery, ionization, or *x*-rays, but the average patient will not trouble about seeing a specialist on that account, being well satisfied with the results already obtained.

Even in the worst possible cases, those of army pensioners of five and more years' standing, he has always had quick and satisfactory results. The treatment is a combination of the method advocated by two of his teachers, Sabouraud of Paris and Heath of Birmingham, with a few additions.

The scalp condition in acne patients should also be attended to if greasy, scurfy, or both. In men, washing with sulphur soap three times a week will generally remove the condition. In women, washing once a week with sulphur soap and the daily application of a lotion containing mercury perchloride and salicylic acid will also generally be successful. The scalp condition should be attended to in all these cases because seborrheic conditions lead, among other things, to a form of diffuse alopecia, and very often also to a crop of boils on the back of the neck.

As a warning, he points out that about one per cent of general skin patients are intolerant to the external application of sulphur, but personally he has never seen it in patients suffering from acne vulgaris.

The Treatment of Certain Cardiac Irregularities with Quinidine.

LEVY, in the *New York State Journal of Medicine* for January, 1924, states that various criteria for the selection of patients have been advanced. A good myocardium is the prime requisite. This usually means that there is little or no cardiac hypertrophy and that the symptoms of failure, if present, yield promptly to treatment. Fibrillation of recent onset responds more readily to quinidine than that of longer duration; though one of his most satisfactory results was achieved in a man who had been known to be fibrillating for seven years. He had, however, a competent heart muscle. Etiology, likewise, furnishes but little aid in choice. Rheumatic and arteriosclerotic groups have fared about equally well. Cases of mitral stenosis have done better than those with aortic disease or combined valve lesions. In his experience, patients with no valvular disease and relatively small hearts have fared best. Cases of hyperthyroidism, in which the heart muscle has not been badly damaged, have also been greatly benefited, especially when there has been coincident improvement in thyrotoxic symptoms.

Conversely, patients with evidences of a badly damaged myocardium are unsuitable for quinidine treatment. Such individuals, even after proper measures instituted to relieve heart failure, regain but little cardiac reserve. They have, as a rule, hypertrophied hearts. In them, it is rare to restore normal rhythm; and if this should return, its duration is apt to be brief. In this group must be placed cases reported by some observers as "unimproved after resumption of sinus rhythm." It is in these individuals also that untoward effects are likely to occur.

The technique of administration is important. The patient should be in bed, under close observation, preferably in a hospital where alterations in mechanism may be followed under electrocardiographic control. Treatment at home, under the supervision of a competent nurse, familiar with the actions of the drug, is permissible. The treatment of ambulatory cases is to be deprecated.

It is advisable, before starting with quinidine, to combat heart failure, if this be present. Digitalis should be given, if indicated. An interval of four or five days between the completion of digitalization and the beginning of quinidization has been found desirable, for both practical and theoretical reasons. [The reader should note this point.—ED.]

The scheme for a course of therapy which Levy has previously outlined, and which has been followed by a majority of workers, has been found satisfactory. The alkaloid is given in capsules, individual doses being administered at two-hourly intervals. In this way adequate concentration is maintained. On the first day are given two small doses of 0.2 gm. each. These serve to test for drug idiosyncrasy. If symptoms of cinchonism are noted, it is wise to desist at this point. Otherwise, on the second day, are given three doses of 0.4 gm. each; third day, four doses of 0.4 gm. each; fourth day, five doses of 0.4 gm. each. If further dosage seems desirable, the plan followed on the fourth day is continued. No more than 2.0 gms. are given in a twenty-four-hour period.

It is rarely necessary or advisable to continue treatment for longer than a week. For if normal rhythm is to be established, the change will usually occur within this period, most often between the third and fifth days. Should it appear after more prolonged therapy, it is unlikely to be permanent. However, if one course of treatment is unsuccessful, and without unpleasant symptoms, a second may be given after a short rest. Sometimes such a second course results in a satisfactory issue.

The duration of effect after a single course of therapy is variable, ranging from a day to as long as a year and a half. In the cases of fibrillation of long standing, there is usually a tendency to relapse, often at fairly definite intervals. In one patient, known to have been fibrillating continuously for two years, and in whom the duration of normal rhythm after a course of treatment was about three weeks, uninterrupted normal rhythm was maintained for sixteen months by the daily administration of 0.4 gm., supplemented every two weeks by three capsules of 0.4 gm. each. Fibrillation recurred at the end of this time because the man was unable to procure his usual supply of quinidine. He returned to the hospital, and in four days his heart was again beating regularly. He went back to his job as an iron-worker. There was no evidence that such prolonged quinidization produced any deleterious effects.

The cases of paroxysmal fibrillation are worthy of special mention, because in them the results of continuous medication have been gratifying, according to a number of accounts. Hart reports a man, in whom the attacks recurred at intervals of a few days, who, on daily doses of 0.4 gm., went for a year without relapse. He (Levy) has at present under observation a man who had been having attacks of fibrillation every two or three weeks for two years. He has now gone for four months without recurrence and with great relief, both physical and mental. Patients with paroxysmal fibrillation commonly possess a relatively competent myocardium. In these cases the dangers of untoward effects from quinidine, especially embolism, are negligible.

Acute Infections of the Urinary Tract—Pyelitis.

Hoppe, in the *Archives of Pediatrics* for January, 1924, states that notwithstanding all adverse criticism, current literature contains claims of success of hexamethylenamine where other drugs have failed. Each of us could add cases from our own experience which would bear out this fact. How can we explain these undisputed therapeutic facts in the face of so much adverse criticism? Since formaldehyde is formed solely in the bladder and since the seat of infection is frequently here and not in the pelves, might the beneficial results rest on the fact that we are dealing with a cystitis and not a pyelitis? Careful cystoscopic examination might throw some light on this question.

It has been said that if beneficial results are to be expected from hexamethylenamine, the drug should be given in large doses and the urine made acid by phosphates or benzoates, and that the fluid intake should be limited so that the formaldehyde when formed will be as concentrated as possible in the limited output of urine.

Helmholz, after a critical review of the literature, concludes that few observers have found hexamethylenamine of much value.

Among the other drugs used to disinfect the urinary tract, salol or phenylsalicylate might be mentioned. It has been shown that doses ranging from 120 to 150 grains a day have no demonstrable effect on bacterial growth in the urine. In infants any approach to such massive doses is out of the question.

Certain Italian workers have used neoarsphenamine intravenously in doses of 0.09 to 0.4 gramme at weekly intervals and claim good results.

Pelvic lavage and irrigations have given good results in cases of pyelitis in adults. Recently this has been tried in infants and children. The results are as yet inconclusive and the technical difficulties so great that it should be attempted only by an experienced cystoscopist. Furthermore, the systemic reaction following this form of treatment is often severe.

Of the drugs used to render the urine alkaline and to increase its output, the bicarbonates and citrates rank first. To Thompson of Edinburgh the credit must be given for first calling attention to the value of alkalies in the treatment of pyelitis. No

adequate explanation was given as to the mode of action. It is generally agreed that these drugs must be given in sufficient quantities to render the urine alkaline. Still advises frequent small doses given well diluted rather than larger doses given at longer intervals. To obtain the best results they must be continued for weeks after the symptoms have subsided; otherwise a relapse is to be expected. It is sometimes surprising to find the large amount of these drugs required to render the urine alkaline; 240 to 300 grammes of sodium bicarbonate in twenty-four hours is sometimes necessary. There seems to be a decided advantage in using the sodium salt. Diarrhea, vomiting and anorexia are less likely to occur when sodium is used.

One might write at length on the value of alkalies. Many observers hail them as a specific for this condition. They are the most universally used of all remedies in the treatment of pyelitis in infants, and their great therapeutic value is doubted only by those who have not used them in sufficiently large doses. What is the mode of action of the alkali group of drugs? The most common theory advanced is that the colon bacillus cannot grow in the strongly alkaline urine. The highest alkalinity known to occur in the human urine is that of Ph. 8.6, or the same alkalinity as a saturated solution of sodium bicarbonate. Actually in such a medium colon bacilli flourish, and in fact grow much more rapidly than in a highly acid urine. This fact alone renders this theory untenable.

The disappearance of the general symptoms of fever, malaise, etc., following the use of the alkalies has led some to believe that the toxins formed by the colon group were harmless or rendered inactive in an alkaline medium. Helmholz has shown that neither acids nor alkalies have any effect on the quantity or quality of the toxins produced, nor can any difference be noted in their action on animals.

The diuretic effect of the alkali group of drugs is an undisputed fact. Other diuretics have good effects on cases of pyelitis. It is very probable that the beneficial results of the alkalies rest partially at least on their diuretic action.

Certain observers claim that the highly acid urine found in cases of pyelitis is irritating to the inflamed mucous membrane, and when this urine is rendered alkaline it becomes less irritating and allows the inflammation to subside. Undoubtedly the acid urine is irritating, as shown by the fact that painful urination occurs and is manifested in older children, and this symptom can be controlled by alkalinization. However, this could not be the only mode of action of the alkalies because the irritating acid urine could have little harmful action when the seat of infection is not actually in the mucous membrane, but is periureteral and peripelvic, as is often the case.

A recent theory which has been advanced claims that in an alkaline medium the leucocytes are more active in destroying bacteria, that the body tissues are in some stimulated to produce more antibodies, and that these antibodies are more active when the medium in which they act is strongly alkaline. It is to be hoped that evidence can soon be shown to render this theory an established fact and in some way explain the undoubted beneficial results following the use of alkalies in the treatment of pyelitis. For while few observers will question their therapeutic value in this condition, it is certain that no adequate scientific explanation of their mode of action exists.

As in other chronic infections, likewise in pyelitis, vaccines have been recommended and used. Brilliant results sometimes follow their use, particularly the autogenous vaccines. Cabot reports success in over one-half the cases in adults. Geraghty, on the other hand, reports a total failure. These few expressions are typical of many others, and in fact are typical of most reports of vaccine therapy in general, for as yet vaccines are unreliable agents. In any event it seems clear that the initial dose should be large, 200,000,000 to 500,000,000, and rapidly increased, depending on the local and general reaction.

Based on the fact that certain foreign proteins, when injected into the body, often produce remarkable relief from focal joint infections, Cowie has used horse serum intramuscularly in treating chronic pyelitis. He reports a series of cases some of which have been observed for three years after injection, most of which were cured and others markedly benefited. He uses 3 to 10 cc intramuscularly every two days. The beneficial results are not necessarily dependent on the serum sickness which often follows, but seem to be due to the production of certain antibodies in the circulation, the horse serum acting as a stimulus to their production. This method, while new, certainly gave good results in Cowie's hands. Further confirmation is necessary before it should be generally adopted.

Before giving too much credit to any mode of treatment of pyelitis, one fact should always be considered, and that is that certain cases will recover without any treatment whatever. On the other hand, when cases fail to respond to the usual methods of treatment, infection in the kidney should be suspected and every effort made to rule out such conditions as kidney abscess.

The Treatment of Consumption by Artificial Pneumothorax.

SHAW, in *The Practitioner* for February, 1924, states that he agrees with those who long ago maintained that artificial pneumothorax should be induced as soon as consumption is discovered, however early. From the sociological point of view, it is dangerous for a case of open tuberculosis of the lungs to live in close proximity with children, whether the stage of the disease is early or late. His experience of artificial pneumothorax during the last few years has shown him that the earlier the treatment is begun, the less likely is it that annoying adhesions will prevent the establishment of a complete collapse; incomplete collapse of the lung may produce very satisfactory results, but they are not to be compared with those produced by complete collapse. Another point of moment is that patients are not always punctual in their attendance for refills, and with incomplete pneumothorax, prolongation of the interval between the refills by only two days has been followed by expansion of the lung and adhesion to the chest wall, so that further refills were difficult or impossible.

It is no part of his function as a physician to discuss the surgery of the adhesions which prevent complete pneumothorax, or which prevent pneumothorax of any degree, but from the little that he has seen of the surgeon's difficulties in these cases, and being completely converted to the belief in the immense good to be attained by a complete pneumothorax, he is resolved to recommend pneumothorax as early as possible, and he thinks also that it would be wiser to induce artificial pneumothorax in the early stages of consumption both in those who cannot afford expensive and continuous climatic and sanatorium treatment, and in those who can do so.

He sounds the warning that before the method is adopted, the patient should be fully informed of all the difficulties that may be met with; for example, it may prove, after all the trouble is taken, that pneumothorax cannot be induced because of universal pleural adhesions; that when it is induced it may not be a complete one, and the fullest favorable results cannot be secured; that the lung dealt with is going to be lost forever—a direct denial of what used to be taught that after a time the lung may be allowed to expand again; that it is not known how long it will take in any individual case to secure permanent collapse of the lung—it may take any time up to five years; that the induction of pneumothorax may be followed by a serous, or even purulent, pleural effusion which may have to be, in the latter case, removed frequently, or in the former case occasionally, when excessive in amount; but one is able to assure the patient that gradually the refills need only take place at longer and longer intervals until at last they are no longer necessary, and that sometimes the

opposite lung grows to make up for the loss of the collapsed one, and that sometimes this does not take place, and that a permanent pleural air-containing cavity persists in the side treated, without the collapsed lung ever expanding again.

It is in this prolonged period of treatment that the general practitioner in the future will be of such essential use, for he can, after a few lessons, learn how to carry out refills at increasing intervals, the length of time which can be assessed the most accurately by the help of radiography. The patients who are undergoing this treatment, where necessity compels, can and do resume their occupations if not physically strenuous ones, and even light manual work is given to those who can be kept under close supervision while the collapse is being firmly secured.

Despite all the difficulties in initiating and maintaining a collapsed lung, whether they are the difficulties of the patient or of the doctor, he is convinced that this treatment has a great deal to be said in its favor. The relief given is prompt and effective, so far as symptoms are concerned; septicemia is not allowed to develop, or if it has developed, is checked and even remedied; duties may be resumed, though in a minor key, and life at home is rendered perfectly safe to other occupants. Owing to the fact that there is but one lung left in a successful case, it is most desirable that the patient should live and work away from densely-populated areas.

Standards for Whisky and Brandy.

In an editorial on this subject the *Boston Medical and Surgical Journal* of February 21, 1924, states that an announcement has recently been made by E. Fullerton Cook, chairman of the Revision Committee of the United States Pharmacopœia, that standards for whisky and brandy as medicines will be included in the new Pharmacopœia now being revised. This is in response to a demand by the physicians of the country.

Under the national prohibition laws, whisky and brandy are classed as medicines, and as such are legally prescribed in many cases of serious illness, but at the present time no legal standards exist for their purity.

All physicians of the General Revision Committee, acting as a subcommittee, were appointed to study the situation and take the necessary action. This subcommittee has issued the following statement:

"In view of the fact that a large number of physicians in the United States believe alcohol to be a valuable therapeutic agent, and in view of the wide-spread adulteration of the alcoholic liquors at present available, the members of this Referee Committee feel that, for the protection of the public, there should be an official standard for medicinal spirits."

By including standards for whisky and brandy as medicines, in the Pharmacopœia, which is the legal standard for drugs and medicines under the Food and Drug Act, the machinery of the U. S. Department of Agriculture and of the Boards of Health and Boards of Pharmacy throughout the country is enlisted in protecting the sick against adulterated and poisonous products.

A Study of Three Hundred Cases of Pertussis in a Hospital.

HERRMAN and BELL, in the *Archives of Pediatrics* for January, 1924, state that females are more frequently affected with pertussis than males.

Eighty per cent of all cases of pertussis occur in children under five years of age.

The largest number of cases of pertussis occur during the summer months, at a time when the other communicable diseases are at their lowest point.

Every spasmodic cough is not whooping-cough. There are cases of pseudo-pertussis. The term pertussis should be restricted to an acute infectious and communicable disease, caused by the Bordet-Gengou bacillus.

The Bordet-Gengou bacillus is regularly present in the catarrhal stage of the disease.

Pertussis is most communicable in the catarrhal stage, when its true nature is not

recognized. It is usually not communicable after the fourth week.

In a series of 297 cases the duration of the disease was from 5 to 12 weeks in 70 per cent of the cases; in 80 per cent the whoop lasted from 1 to 4 weeks; and in 86 per cent the vomiting lasted from 1 to 4 weeks.

The respiratory complications are by far the most important. They are present in 58 per cent of the series. Fourteen per cent had a complicating bronchopneumonia.

The earliest and most characteristic change in those patients who have bronchopneumonia is the presence of localized fine resonant râles at the base or at the angle of the scapula, especially on the left side.

The susceptibility and unfavorable course of pneumonia in infants is probably due to immunologic, not to anatomic, peculiarities.

There is no conclusive evidence that pertussis is an important factor in the causation of pulmonary tuberculosis. A positive Pirquet reaction does not become negative in the course of pertussis.

The principal aids in the early diagnosis of pertussis are the presence of a relative and absolute lymphocytosis in the blood; the presence of the Bordet bacillus in the sputum; and a positive complement fixation test. The cutaneous tests have not proved of any value.

The prognosis in pertussis depends on the age of the child, and on the presence or absence of pulmonary complications.

There are more deaths from pertussis among females than among males.

Eighty per cent of all deaths from pertussis occur in children under two years of age.

The greatest mortality occurs in the late winter and early spring, and is largely due to intercurrent catarrhal infections which cause pneumonia.

In a series of 297 cases of pertussis, 90 per cent of the deaths were due to a complicating pneumonia. The mortality in those patients who had pneumonia was 18 per cent. The mortality in those who had pertussis and measles was 30 per cent.

Pertussis is difficult to control because it is most communicable in the catarrhal stage, when its true nature is not recognized.

In selected cases treatment in a hospital is necessary and advisable.

The cough is not the only or most important symptom of the disease. The nervous system and the nutrition are also affected.

Patients with pertussis should be kept in bed. If possible the bed should be placed in the open air.

Meteorologic conditions seem to have an effect on the paroxysms, for patients may show changes in the frequency and the severity of the cough, from day to day, irrespective of treatment.

In the control of the spasmodic cough, antipyrin fortified by bromides has given the best results. They have not obtained favorable effects from injections of ether, or from vaccination.

Pertussis vaccine has a specific effect in about one-fourth of the cases. In those patients which fail to respond to treatment, the vaccine may be given too late or they may not be due to the Bordet bacillus.

When a case of pertussis occurs in an institution for infants and young children, it might be worth while to prepare an autogenous vaccine from the first case, to be used for immunizing and therapeutic purposes in the other children.

Herrman and Bell state that we shall not be able to control the spread of pertussis or to reduce the great mortality under two years of age until we have a method of immunizing infants against this disease.

The Wassermann Test as a Criterion of Cure for Syphilis.

BELDING, in the *Boston Medical and Surgical Journal* of February 21, 1924, states that early cases of syphilis, because of the possibility of sterilization, and old syphilitics with active lesions, which indicate the inability of natural resistence to cope with the infective process, require treatment. The term "treatment" as used in this paper is limited to drug therapy. Some latent cases need treatment, others do not; but

physicians are not yet competent to decide which may safely be left untreated. Treated cases comprise three classes: (1) those who recover naturally without or in spite of treatment; (2) those who respond to treatment; and (3) a small number who in spite of thorough treatment because of low resistance or susceptibility succumb to the disease. Sterilization by means of treponemicidal chemico-therapy appears most effective in early syphilis. In late syphilis the healing of the pathological lesions and the reduction of the disease to an inactive state are the most that can be expected.

A comprehensive definition should include cure through the natural defensive mechanism of the patient and through drug therapy. So indefinite and complex a subject defies limitation within the narrow scope of any arbitrary rules; yet for a working basis it is necessary to formulate certain principles. Permanent cure can be obtained only by the eradication of the treponema from the body. All other cures, natural or artificial, while practically permanent, necessarily must be temporary, inasmuch as a potential focus of infection, as in tuberculosis, may remain. A temporary cure demands: (1) the elimination of all active symptons or lesions; (2) the healing in so far as possible of old anatomical lesions; and (3) the reduction of the disease to a latent condition through the immunity of the patient or the loss of virulence of the infecting organism.

The Wassermann reaction in both treated and untreated syphilis represents an immunological response on the part of the patient, which is distinct from the clinical course of the disease. In the average case clinical syphilis and the reaction run a parallel course, but in the individual patient the reaction may or may not be comparable to the clinical findings. Although an index of the response of the patient it furnishes no absolute measurement of his resistance or of the activity of the disease. Provided allowance is made for the unsatisfactory negative, the reaction of the blood serum is of value for diagnosis, but as a criterion of cure it has limitations.

As untreated syphilis becomes chronic or quiescent, the Wassermann reaction tends to become negative. Treatment accelerates this process. The Wassermann test is not sufficiently delicate to show the complete elimination of the antibody from the blood serum, and only furnishes evidence that it has fallen below a certain standard. In early syphilis treatment rapidly reduces the antibody below this figure, but many instances of the recurrence of clinical syphilis in insufficiently treated cases testify that such a negative is not a proof of cure. Likewise, clinical syphilis is not uncommon in patients with negative reactions. The use of increased amounts of serum in the test, if properly controlled, will reduce materially the number of pseudonegatives, but even this refinement will not permit the test to serve as a criterion of cure.

The ordinary Wassermann test, which merely records the narrow range between a strongly positive and a negative reaction, is less satisfactory than the quantitative test, which gives the titrated strength of the antibody. In untreated cases this additional information may be of prognostic value, and a high titre antibody in old syphilitics may indicate an unsuspected visceral or vascular involvement. In treated cases it is an index of the earliest serological response to treatment and as such serves as a guide for drug therapy.

Not infrequently patients in spite of thorough and prolonged treatment maintain a persistent positive reaction. The Wassermann-fast patient under treatment either shows no change in the strength of the reaction or gives a partial reduction, which never reaches a negative. Certain patients who are resistant to one drug may yield a negative reaction when treated with another; others seem resistant to all forms of medication. Patients with visceral and vascular syphilis are particularly resistant to treatment. The average patient with a persistent positive reaction is more likely to have an unsuspected focus of infection or show a recurrence of the disease than one with a negative reaction. However, in certain patients a persistent positive may not

indicate prolonged treatment, particularly since theoretically it is possible for the reaction to persist after the disease has reached the quiescent state of temporary cure.

In connection with negative clinical findings and thorough treatment a negative Wassermann reaction is of corroborative value in determining temporary cure. By itself the negative reaction does not indicate the cessation of treatment and a persistent positive may not always call for further treatment. The quantitative positive reaction is a valuable guide to drug therapy and an aid in diagnosis, but the Wassermann reaction of the blood serum is not a criterion of cure for syphilis and in this respect is inferior to a complete serological examination of the blood and spinal fluid.

Observations on Non-specific Protein Therapy in Focal Infections.

In the *Ohio State Medical Journal* for February, 1924, DeCourcy discusses the non-specific agents that have been used. He has found that it is advisable to use one form of non-specific therapy, and so gain experience with a definite preparation in a certain class of patients. In this way it is possible to determine the results that are to be expected with fair accuracy.

He selected milk injections (intramuscularly) in his series of cases because the reaction seems less drastic. He also felt that the trauma produced by these injections would cause more autolysis of tissue.

The milk was prepared by heating in closed vessel (in boiling water) at 100° C. for twenty minutes; injections were given deep into the gluteal muscles, starting as a rule with 5 cc and increasing to 10 cc by the second or third injection. Injections were given every three or four days, depending on the reaction. If no improvement was noted after two or three injections they were discontinued.

The febrile reaction following a uniform dosage of 10 cc of milk intragluteally varies with the type of disease. There was usually a rise in temperature within ten to twelve hours, very often chills, headaches, and sweating, restlessness the first night, fever persisting from twenty-four to forty-eight hours. In acute febrile cases the temperature would rise, reaching a maximum in six to eight hours, but would recede to its former level in twenty-four hours.

The pulse increases in ratio with the temperature. It has been noted that a rapid pulse in acute conditions is a contraindication to this form of therapy. The injections were used only in patients free from cardiac disease.

The blood sugar was lowered in the majority of his arthritic cases, which suggested the effect of metabolic processes.

The blood-pressure was not followed consistently enough to be of any value, although in several cases followed by chills and sweating the readings dropped from 10 to 15 mm.

It was noted that in the majority of cases injections were followed by slight diuresis.

The leucocyte count was invariably raised. In some cases the injections were followed by a primary leucopenia, the leucocytosis following, consisting largely of polymorphonuclear neutrophiles. A slight increase in the eosinophiles would often take place, after the fever subsided. Muller has called attention to the myelocytic stimulation, indicating a marked stimulation of the bone-marrow. The best clinical results were noted in patients who reacted with high leucocytosis.

The red count especially in anemic conditions was increased. The lymphagogue effect has been frequently noted and the euphoria that invariably follows non-specific injections has been attributed by many observers to be due to this.

No resulting albuminuria was noted following injection, but it was observed that in two cases of arthritis complicated by albuminuria, following injections, casts and albumin disappeared almost immediately from the urine.

It was observed that the weight of the

arthritic cases, even in advanced cases, increased during the period of treatment.

The menstrual flow in a number of cases was increased by the injections, suggesting endocrine stimulation.

The typical focal reaction following injections has been noted by him repeatedly, tonsils flaring up, chronic gall-bladder or appendix becoming tender, old inflammatory lesions in nose and eyes, male genito-urinary tract and female adnexa becoming slightly active. The value of the reaction becomes apparent if the fundamental cause is in doubt. In two asthmatics definite foci were established in accessory sinuses which were not revealed by examination or *x*-ray.

Peterson thinks that diphasic character of the reaction is of paramount importance in the therapeutic application, a negative phase in the sense that the tissue is altered more from the normal than heretofore—that is, evidence of inflammation increased; then a positive phase during which there is a progressive diminution of the inflammation until the preinjection stage is reached or passed. Augmentation of the inflammation is followed by a diminution until healing is accomplished. This observation has held true in the majority of his cases that resulted favorably. The best results were obtained when non-specific therapy was used early in the disease processes. He used non-specific therapy in cases principally that had resisted various types of treatment, and in cases which he felt could be hastened to relief or recovery.

The Treatment of Congenital Syphilis.

WELCH, in the *Archives of Pediatrics* for February, 1924, states that the only satisfactory therapy is the administration of the specific drug by the physician at regularly selected intervals. This permits frequent check as to the child's general condition, including diet, stools, and weight, and a recorded definite amount and interval of dosage, and safeguards intolerances. Any method which permits quick control, maintains the control, and tends to decrease the duration of needed administration, is of inestimable value. With this conviction, the method of choice is the giving of the selected mercurial and arsphenamine intramuscularly or intravenously, and iodide when needed as an adjunct by mouth or intravenously as deemed wise.

As to the selection of drugs given by mouth: mercury with chalk is especially of value in young infants, the dose being 1/5 grain three times daily, up to 2 grains in older children; calomel, 1/10 to 1/20 grain three times daily to 1/4 grain in older children; mercury protoiodide is an excellent drug in two-year-olds and older children, dose 1/16 grain to 1/4 grain three or four times daily.

The selection of inunctions are those which permit of definite dose, therefore the individual rubbing should be weighed or fairly accurately measured. Parke, Davis & Company's mercurettes, 30 grains each, are to be recommended. The use of the mercury belly-band has its occasional application. None of these methods are procedures of choice except in the rare case, or at times when certain other factors make desirable methods impracticable.

The present therapy status gives preference to the routine intramuscular administration of mercurials and neoarsphenamine. The procedure is simple and requires very little time for the individual administration. A little care with a few details makes it possible to use almost indefinitely the gluteal group, particularly if one's work includes adults. Three-and-a-half-inch or 3-inch 21- or 20-gauge needles are to be used. These are of sufficient length to go through the fat pad and are practicable in infants and children. The needle may be inserted to the proper depth, retracted or carried in to greater depth when necessary, the idea being to use the depth of insertion needed to get the drug into the belly of the muscle. By being careful not to use the same sites in the same muscle group too frequently, we may continue with the same

areas as long as necessary without lumping or excessive thickening, except in the occasional patient. Most indurations are due to improper placement or to leakage back into the subcutaneous fat. Thickening more often follows neoarsphenamine than the mercurials.

Bichloride of mercury, because of the ease of making a solution, its stability and low cost, must continue to predominate in clinics and is a good drug of selection, occasionally being contraindicated by the appearance of albumin in the urine. He has used the gluteal group, deltoids and triceps sites satisfactorily.

Biniodides have been used in children four years and older.

Mercury salicylate is an excellent drug in good suspension. For clinics, palmatin or liquid albolene suspensions, 1 gr. in 10-20 minims, give good results.

Neoarsphenamine has been with few exceptions (intravenously) used routinely in all cases, both intramuscularly and intravenously.

Added intravenous therapy in infancy and childhood makes it possible to offer to these infected children selected dosages and drugs used in adult treatments. The vein of selection is the most accessible one wherever it may be found. The veins are oftentimes larger in the congenitally infected infants. They may be found in the scalp (the bony skull background makes these less difficult to enter); the neck veins; long saphenous vein as it crosses close to the internal malleolus; the arm veins at the elbow bend. The neck veins are nearly always accessible. Crying causes an engorgement and aids entrance. The intravenous route is to be selected for routine if the veins are sufficiently accessible; they are to be preferred for neoarsphenamine or arsphenamine. This method even though difficult is indicated when activity demands quick mercurialization, or the quick benefits of the arsphenamine. The longitudinal sinus is to be used only for the taking of blood specimens.

His technique is to use freshly distilled water in small quantities: *Intramuscular*—Neoarsphenamine up to 0.3 gm. in 1 cc of water, larger doses in 10-20 minims of water. *Intravenous*—Neoarsphenamine in 2 or 3 cc of distilled water, depending on size of dose. *Mercurosal* intramuscularly given in 1 cc of distilled water, intravenously in 2 or 3 cc of water. Mercuric chloride intramuscularly in a 1-per-cent or oftentimes in larger doses in a 2-per-cent solution. Intramuscularly it may be given in 5 cc of normal salt solution—the compound being a chloride; the normal sodium chloride is unaffected, so that the drug is carried in an isotonic solution. In administering a drug in solution of distilled water there are two reactions to consider: first, the distilled water not being isotonic may give rise to blood hemolysis; and secondly, we have to deal with the reaction to the drug *per se*.

Fordyce and Rosen, and Jeans, have been followed as to dosage. To quote from Fordyce and Rosen: "We are now giving from six to eight injections of arsphenamine to the course and make the initial dose 0.1 gm. for infants from two to twelve weeks old; 0.15 gm. from three months to nine months; 0.2 gm. from one to two years; and 0.25 to 0.3 gm. for children three years old. The mercuric chloride, too, we have increased to from 10 to 12 injections to the course, at intervals of a week, and the dosage as follows: 1/10 grain for children from two weeks to six months old; 1/8 grain from six months to one year; 1/7 grain from one to two years; 1/5 grain from two to three years; and ¼ grain for those more than three years old." According to Jeans the dosages are 0.03 cc (½ minim) of a 1-per-cent mercuric chloride to each kilogramme (2½ pounds) of body weight. Neoarsphenamine 0.01 gm. for every kilogramme (2½ pounds) of body weight.

It has been the routine of Welch to give from 8 to 15 doses of mercury, with 5 or 6 doses of neoarsphenamine to a series. The interval between mercurosal treatments is two to four days; between the other mercurials and neoarsphena-

mine five to seven days. The giving of the latter does not interrupt the mercurials. Three series constituting one treatment regardless of the Wassermann becoming or remaining negative. Additional series are given as indicated. After the initial Wassermann and Kahn flocculation test, which should always be taken, tests from time to time during treatment are helpful. Routinely one month after a series or always before the next series a Wassermann and Kahn flocculation test is made. After the last series these are repeated at the end of one month, at the end of each three months for one year, at the end of each six months for one year, and then once a year or upon any questionable manifestation up to adolescence if possible. A negative spinal fluid Wassermann is established before accepted cure.

Alcohol: Its Use and Abuse.

DIXON, in the *British Medical Journal* of February 23, 1924, after speaking of the wide distribution of alcohol throughout nature, always in association with living cells, states that in man both yeasts and the Bacillus coli communis form it in the alimentary canal, and as it is one of the most easily absorbed of all substances it must be taken up directly into the system. Three important facts about alcohol might be regarded as established. The first is that alcohol is very rapidly absorbed from the stomach and intestines into the tissues, where it is oxidized very slowly, and there it can be regarded as a food, in the sense that it spares the carbohydrates, fats, and proteins.

The late M. Duclaux, of the Pasteur Institute, was so much impressed by the experimental evidence on this question that he asserted that alcohol is a food surpassing starch and sugar in alimentary value, since weight for weight it contains more energy. The second fact about alcohol is its so-called stimulant action on the central nervous system: Mental operations are shortened, simple reaction times quickened, mental associations (such as making words to rhyme) facilitated, reading in whispers rendered easier, and the appreciation of small differences in weights enhanced. The view that all these effects are due to direct stimulation of the central nervous system, as in the case of caffeine or cocaine, may be regarded as disproved; they are due to a direct depression, beginning with the activity of the higher faculties of the mind. The activity of these faculties is blunted, and the real person is liberated from the bondage of those restraints which social customs and conventions demand. Alcohol frees the primitive instincts and emotions. For all precise mental operations the use of alcohol is detrimental, whether in typewriting, target pricking, typesetting, shooting, choice reactions, and the like; it diminishes accuracy and speed. Alcohol is an artificial means of relaxation; under its influence the burdens, anxieties, and worries of the modern strenuous life are forgotten. The sociability produced by the flowing bowl, as described in picturesque writings, is really due to the diminished irritability of a supersensitive nervous system.

The third fact about alcohol which appears to be generally accepted is that in conditions of fatigue and mental depression alcohol acts as a true stimulant in that certain faculties of the mind, such as attention and memory, are improved. This lecturer indicates the possible value of alcohol to a mental worker returning home to dinner, irritable and overwrought, after a strenuous day, and unable to take an interest in his food. Physiologists are aware that appetite and digestion are largely influenced by the mind. If worry and anxiety are removed, appetite and digestion will return. It may, therefore, almost be said that *apéritifs* are physiological under present-day conditions were it not for the fact that they are so often consumed by the wrong people. But, in spite of these and other useful functions, the evidence is clear that alcohol is not a necessity for a healthy man; it is a luxury, and an expensive way of taking food. On the other hand, when

it is taken in strict moderation, injurious effects have yet to be proved.

He stated with reference to the social effects that thousands of people are reduced to poverty, misery, and disease, and are provoked to commit crime, as a result of excessive drinking; on the other hand, millions of people state that alcohol adds to the joy and general agreeableness of life. Social workers and physiologists from time to time arranged and annotated the evidence for and against alcohol, and placed it before the public. He thought that every one should be grateful for reviews such as his, because truth comes first, even before the principles one has been accustomed to advocate. But in this connection it may be interesting to note what the publican, who has an interest in the elimination of drunkenness, thinks to be the most frequent causes of that condition. In an inquiry among London publicans the following were given as the principal reasons for drunkenness: irregular feeding, intensive drinking during shorter hours of trade, discomfort of home life and domestic troubles, mistaken kindness of friends. It is generally agreed by these close, if not unbiased, observers that food is the solution of the problem. The publicans say that foreigners, including Jews, rarely get drunk, because they eat while drinking.

The most important class of drinkers has yet to be considered—namely, the alcoholics, the group which has created the drink problem. It is important to learn something of the nature of the desire which impels the alcoholic to take alcohol. One of the most drastic prohibitions ever attempted in history is the U. S. Harrison Narcotic Law, and after a trial of eight years it is the universal opinion of those best able to judge that the law has signally failed in its purpose. He believes the explanation to be that too little thought is given to the nature of the addicts, and all the consideration is concentrated on the drugs.

The word "alcoholism" is sometimes too widely used; it should be strictly analogous to "morphinism" and "cocainism." Alcoholism used in this sense is not drunkenness nor the habit of drinking, even occasionally, to excess. The normal man, after taking alcohol, becomes in certain respects abnormal. The alcoholic, on the other hand, takes alcohol because he needs it if he is to become normal. He is a neurotic, to whom every common incident of life is exaggerated. Alcohol gives him temporary relief from his inertia and depression. Alcoholism is regarded by many eminent authorities as a symptom of the preëxisting mental condition. In the early stages the alcoholic resists the craving, but soon, whenever he feels depressed, his one thought is drink. The mental physician must determine how best to treat the neurotic, but it is well to remember that the neurotic type of alcoholic is precisely the same type of person who, if opportunity offers, will take to drugs; temporarily this gives him the relief that alcohol gives, and after once partaking of the joys of the hypodermic needle he practically never returns to alcohol.

The Total and Basal Metabolism in Exophthalmic Goitre.

Boothby, in *Minnesoata Medicine* for February, 1924, states that in detailed studies he has found that persons with exophthalmic goitre or adenomatous goitre with hyperthyroidism, if left to their own inclination, eat from one and one-half to three times as much food as normal persons under the same conditions of rest or work. It is, of course, impossible in general practice to make an accurate study of the food intake. For diagnostic purposes, however, it is sufficient to learn, by direct questioning, whether the patient is eating more than usual, and at the same time lying down a greater part of the day. Patients will say that there is nothing the matter with their appetite, and that they are eating more than normally. The significance of even an apparent slight increase in the amount of food taken is of particular importance if, at the same time,

the patient is losing both weight and strength.

Often in cases of exophthalmic goitre, and but rarely in cases of adenomatous goitre with hyperthyroidism, an estimate of the total metabolism by the food intake is complicated by the occurrence of gastrointestinal crises of nausea and vomiting. As the physician may be called now for the first time, he should, on finding an increase in pulse-rate with or without evidence of cardiac decompensation, inquire into the quantity of food taken in the few weeks preceding the onset of the crisis, which will reveal an increase in the consumption of food, accompanied by more or less loss in weight. If, however, the food intake has been restricted voluntarily by the patient, or on the orders of the physician, evidence of the increased metabolism is obtained solely from the rapid loss of weight. During a period of gastrointestinal crisis with vomiting, or medical restriction of the food allowance, the patient may lose one pound a day. This is readily explained by the fact that these patients burn from 4000 to 5000 calories each day, and if no food is taken they must burn their own fat at the rate of 400 to 500 gms., or approximately one pound of fat each day. Under these conditions, symptoms of acidosis, at least of mild acidosis, are superimposed on the true symptoms of the crisis. It is well known that with starvation, even in normal individuals, a mild condition of acidosis develops as soon as the carbohydrate reserves are exhausted; when the metabolism is increased, as in cases of exophthalmic goitre, a degree of acidosis equivalent to that of a normal person starved for three days may develop in twenty-four hours. In the crisis of exophthalmic goitre, a condition of low blood sugar may develop, accompanied by acidosis; although this is secondary, it forms a link in the vicious circle aggravating the symptoms, and should be avoided. Carbohydrates, therefore, are absolutely essential, and must be given by rectum if they cannot be retained by mouth. The widespread idea that restriction of food is beneficial is erroneous. Several years ago a trial of a restricted diet was made at the Mayo clinic. Patients on this diet failed to do as well as patients on a high caloric diet after this was adopted as a consistent line of treatment.

Until about two years ago no specific treatment was known which would control the gastrointestinal crises of exophthalmic goitre. During the last year and a half Plummer has demonstrated positively that such crises can be stopped by the administration of Lugol's solution. The administration of from 30 to 60 drops of Lugol's solution for three or four days, then 10 drops daily, has invariably controlled all the cases of gastrointestinal crisis in exophthalmic goitre that have come under observation in the Mayo clinic since the method of treatment was instituted. The effect of Lugol's solution in cases of exophthalmic goitre is quite as comparable as a life-saving measure and quite as striking and dramatic as is the effect of insulin in cases of diabetic coma. Besides controlling the gastrointestinal crises Lugol's solution ameliorates the entire clinical picture of the exophthalmic goitre syndrome in a very large proportion of patients. Direct evidence of this is the regained appetite, and the coincident reversal of the weight curve from rapid loss to a slow but steady gain. This improvement is accompanied by a reduction in the basal metabolic rate. For from three to six days after giving Lugol's solution for the first time, there is no change in the basal metabolic rate; on about the eighth day there is a sharp drop in the basal metabolic rate, averaging from 20 to 30 points, sometimes exceeding this amount. The drop is most marked in the acute severe cases, less marked in cases of several years' duration, especially if the thyroid gland is rather large and firm in consistency.

Kocher has repeatedly warned against the indiscriminate use of iodine in the treatment of goitre. This warning should be heeded because iodine in any form is

very likely to change adenomatous goitre without hyperthyroidism to adenomatous goitre with hyperthyroidism; likewise it may increase the intensity of a mildly hyperfunctioning adenomatous goitre. Therefore, before Lugol's solution is used, a correct differential diagnosis must be made.

The use of Lugol's solution in cases of exophthalmic goitre before operation has decreased the intensity of the postoperative hyperthyroid reaction so much that preliminary ligations are needed less frequently, and at the same time there has been a marked lowering of the surgical mortality rate. As Pemberton has reported, the surgical mortality is now reduced to 1 per cent if based on the number of operations, or to 1.7 per cent if based on the number of patients.

Treatment of Abscess of Liver by Aspiration and Subcutaneous Injections of Emetine.

LUDLOW, in the *China Medical Journal* for February, 1924, states that he again commends the statement of Leonard Rogers in closing his lectures on amebic liver abscess: "Amebic or tropical liver abscess is an easily preventable disease in the great majority of instances, and the occurrence of amebic suppuration in the liver should cause serious question in the mind of the medical man in whose hands it has been allowed to develop."

All the cases which he reports had no treatment before coming to his clinic. He has yet to see liver abscess in any foreigner or Korean who has had early and energetic treatment of dysentery with emetine.

He has altered his original plan of treatment by substituting aspiration for open operation in all the cases reported in this series. Naturally he was very reluctant to depart from the open method, especially as the mortality of their one hundred operations was only 10 per cent, the lowest record he was able to find in medical literature. However, an injunction given to him many years ago by one of his professors to keep an open mind led him to give the method of aspiration and subcutaneous injection of emetine a fair trial. He has employed aspiration for diagnosis and has used subcutaneous injections of emetine since 1913, in connection with most of their cases operated upon by the open method.

In the earlier years they were not convinced that the use of emetine greatly hastened recovery, except in the presence of an active amebic dysentery. It is probable that the doses of emetine which were given in the early years were too small and given over too short a period. In his last forty cases of the operative series, wherever the condition of the patient permitted delay, subcutaneous injections of emetine (0.06 gramme) were given daily for two to four days before operation, and continued four days to a week after operation. In every case of suspected liver abscess he starts treatment immediately with emetine (0.06 gramme) daily.

The provisional diagnosis having been made, he proceeds as follows with aspiration:

The site of puncture depends largely upon the case. The site of election is the point of greatest tenderness and swelling. Often this is in the ninth interspace in the anterior axillary line. If there is no special point he usually aspirates here first. In some cases there is a marked swelling below the right costal margin or in the epigastric region. If so, the exploratory needle is first inserted in the region indicated. The needle should not be inserted to a depth of more than three or, at the most, four inches. In the large abscess pus is usually found at a less depth. As soon as the pus is struck a small trocar is inserted (local anesthesia). A small incision in the skin will facilitate the introduction of the trocar and diminish the force required for its insertion. This is desirable, as a thin-walled abscess may be ruptured by the use of much force. A glass syringe (30 cc) connected with the trocar by a short, stiff rubber tube makes a simple and satisfactory aspirator. If the pus is thick or the syringe sticks he injects 20 to 30 cc of Dakin's solution. He evacuates all the pus possible at one aspiration.

In this series he has not injected emetine solution into the abscess cavity. In no case has there been marked hemorrhage. The aspiration is repeated when the patient shows signs of marked pain or swelling. An effusion of serum seems to take place in the cavity, as in one case the last aspiration showed only a bloody serum. Daily injections of emetine (0.06 gramme) are continued until the patient has received from 6 to 10 doses. As yet no case has needed more than this amount, but he would certainly repeat a week's treatment if any signs of recurrence appeared. Should the pus prove too thick for aspiration he would resort to open operation.

There can be no doubt as to the desirability of aspiration, provided it gives as good results as the open method.

Among the advantages are:

Aspiration is done under local anesthesia, while the open method frequently requires general anesthesia.

The patient is saved the shock of an operation, and the annoyance of dressings soaked with pus and the pain of inserting tubes or packing.

There is less chance of secondary infection, with perhaps necrosis of the rib.

The time in the hospital is much shortened. His ten cases averaged eleven days in the hospital.

Even though aspiration should fail, the patient is in better condition for open operation.

Infant Feeding Simplified for the General Practitioner.

In the *Illinois Medical Journal* for February, 1924, BLATT states that the new-born should be nursed at four-hour intervals, six feedings daily from birth. Weaklings and prematures may need the interval shortened to three and in some cases two hours. Failure to gain in weight after the tenth day in normal infants signifies insufficient food. The child will not gain on less than two ounces of milk per pound of body weight per day. Determine the amount of milk the child is nursing by weighing before and after every feeding for several succeeding days. Breast milk may be increased by nursing both breasts at each feeding. If this does not produce sufficient secretion, the nursing should be followed by a complemental feeding sufficient to bring the amount up to normal. Always feed the bottle after the breast and never give water within one hour of nursing time. Do not replace a breast feeding by the bottle until the child is three months old, then do so. This gives the mother greater freedom and makes nursing less burdensome; the mother will nurse her child longer under these circumstances. The ease with which weaning may be accomplished, when desirable, if this plan is followed, is surprising. The earlier a child is given the bottle, the less difficulty there is in having it change from breast to bottle. Furthermore, there is an advantage in being assured that should artificial feeding be necessary, it would be well tolerated. A serious effort should be made to keep every infant on mother's milk until it is nine months old. If there is only as small an amount as one-half ounce of milk obtained from the mother at each nursing, the child should not be weaned but should receive this, followed by a complemental feeding.

Serious disease in the mother or total lack of her milk necessitates artificial feeding. In the majority of children, this is readily accomplished by a simple milk formula based upon the following data:

An infant will take at least two ounces more food at each feeding than it is months old—*i.e.*, a child of two months will take at least four ounces at a feeding.

Boiling milk for two minutes makes the casein curd smaller.

The dilution of milk by either plain water or cereal gruels makes it more easily digestible.

The minimal amount of milk necessary for a child each day is one and one-half ounces per pound of body weight—*i.e.*, a child weighing ten pounds needs fifteen ounces of milk per day to thrive.

All well infants may be put on this

minimal allowance to start, and none should be given more than this amount until the milk tolerance of the individual is determined by experiment.

One-tenth ounce of carbohydrate is required per pound of body weight per day. It should not be added to the milk mixture until the tolerance for cow's milk has been established by several days' feedings. It should then be added to the formula, and the amount increased every second day until the desired proportion is reached. The dextromaltose preparations give the most uniformly good results, but other sugars may be used.

The best results with infant feeding are obtained by weekly increases as the child increases in weight. If the child is gaining six ounces per week, an increase of one ounce of milk and one teaspoonful of carbohydrate is the usual amount. Decrease the water as the milk is increased after the total of a single feeding reaches eight ounces.

The amount of formula for a day's feeding is determined by multiplying the age in months plus two by the number of feedings per day—*i.e.*, a baby three months old will receive in its five feedings twenty-five ounces. The milk constituent will be one and one-half times the infant's weight in pounds. If it weighs ten pounds, it would receive fifteen ounces.

The carbohydrate element will be made up of one-tenth ounce of sugar per pound of body weight, in this instance one ounce.

Such a formula contains 315 calories, as milk (milk is estimated at twenty-one calories per ounce), and 120 in carbohydrates—a total of 435 calories or forty-three per pound—a low limit as a starting-point. Children at this age need at least forty-five calories to gain.

In all artificially fed children it is wise to feed phosphorized cod-liver oil beginning at the third month. This is best given emulsified with equal parts of malt extract so that each teaspoonful contains 1/200 gr. of phosphorus and ½ dr. of oil. It should be given three times daily, always after feeding. Orange juice, beginning with one teaspoonful and increasing one teaspoonful per week until the juice of a whole orange is included in the daily ration, should be started at this time. It is best given before the morning bath. A new article of diet should not be added until one is sure the previous addition is well tolerated.

Spinach, carrots, green beans and peas may be added during the third month. They must be boiled well and forced through a fine sieve. Start with one teaspoonful before the 2 P.M. bottle, and increase slowly. Cereal should be started in this month. It should be fed after the orange and before the bath. The fine wheat cereals are the best. One hour's cooking is essential. It, as well as the orange juice and vegetable, should be given by teaspoon. This is the beginning of the child's education, which has as its final object the proper use of spoon, fork, and finally knife.

Stewed fruit, either prunes or apples, forced through a sieve, may be fed before the 6 P.M. bottle any time after the third month, if the child sits up alone. This, in addition to food value, teaches the child to handle solid food.

The child of eleven months, weighing twenty pounds, has a daily feeding schedule approximately this:

6:00 A.M. Eight-ounce bottle.

9:00 A.M. Four teaspoons orange juice, five tablespoons cream of wheat. This is before the bath.

10:00 A.M. Eight-ounce bottle.

2:00 P.M. Four tablespoons of one of the following vegetables: spinach, carrots, peas, green beans, four tablespoons soup if it is customarily used in the household. Eight-ounce bottle.

6:00 P.M. Two tablespoons baked potato, two tablespoons stewed fruit, one zwieback. Eight-ounce bottle.

10:00 P.M. Eight-ounce bottle.

The slightest indication of diarrhea necessitates the withdrawal of carbohydrates from the milk and of all other food but the milk-water dilution. Severe diarrheas are best treated by using protein milk based on Finkelstein's Eiweis Milch.

There are a number of these on the market. When the stool is again normal, slowly return to the previous diet.

Never feed more than one quart of milk daily. Additional calories for babies weighing more than twenty-one pounds are easily made up by adding semisolid food.

Mercuric Chloride Poisoning.

In the *Archives of Internal Medicine* for February, 1924, WEISS states that the treatment of this intoxication is a difficult problem. In the last decade many so-called specifics have been presented. For several of them claims are made that the mercury is placed in combination with the therapeutic agent, thereby producing a non-toxic substance which subsequently can be eliminated. If the pathology of this intoxication is understood, it is evident that pathological changes take place rapidly, depending on the severity of the irritation. The problem then is how to overcome the effects of the poison. The familiar cloudy swelling and later degenerative changes in the kidney are merely an example of the changes that have taken place throughout the entire body. If the process continues, cell death and necrosis follow, and the organism succumbs to a generalized intoxication. Knowing this, he believes that it is useless to attempt to counteract the metallic poison itself, but that our efforts should be directed toward preventing the irreparable pathological changes that will occur if the intoxication is not combated. The cloudy swelling, nephritis and uremia are associated with an increase in the production of acid bodies. Fischer shows that these changes are due to the acidosis. MacNider found this acid intoxication always associated with mercury poisoning. With another heavy metal (uranium) poisoning, he found that organic acids were produced by the intoxication, and that the administration of an alkali (sodium bicarbonate) lessened the toxicity of the uranium by delaying the formation of organic acids.

The logical treatment, then, seems to be to attempt to counteract any pathological changes that have occurred; to prevent the progress of the pathological changes; and, finally, to eliminate the toxic material as soon as possible.

The treatment he has developed attempts to carry out that programme, and, when compared with other methods of treatment, it has been fairly successful.

This treatment is divided into several stages. As soon as the patient comes under observation—the sooner the better—a stomach tube is introduced, and the stomach is washed with two quarts (liters) of a saturated solution of sodium bicarbonate. This is continued until the washings return clear. Before the tube is removed, 6 ounces (178 cc) of a saturated solution of magnesium sulphate is allowed to remain in the stomach. A soap-suds enema is then given. Most of the patients vomit soon after taking the poison, and probably some of the mercury is eliminated in this way.

To introduce alkali into the system, patients should receive an intravenous injection of an alkali as soon after the preliminary treatment as possible. The preparation that he has used is Fischer's solution. This solution consists of crystallized sodium carbonate (Na_2CO_3.-$10H_2O$) 10 gm., and sodium chloride 15 gm., both dissolved in 1000 cc of distilled water. If this is not available, a solution of 4-per-cent sodium bicarbonate may be used. In patients who have not any abnormality of the circulatory system, from 1 to 1.5 liters can be tolerated without any difficulty. In patients who have taken large amounts of poison, he has given as high as 1800 cc at the first injection. The alkaline therapy is continued by mouth. He has used a modification of the old "potus imperialis" by dissolving 4 gm. (1 teaspoonful) of potassium bitartrate and 8 gm. (½ teaspoonful of sodium citrate in a glass of water, orangeade, or lemonade. The patient receives 8 ounces (236 cc) of this drink from six to eight times a day from the onset. He has rarely used rectal administration of alkali in water on account of the irritation of the lower bowel associated with the bloody

diarrhea. Hot packs have not been used except in the few patients who had a complete suppression. A liberal diet is allowed, including meat, after the diarrhea ceases.

The treatment is controlled by urinalysis. He endeavors to make the urine alkaline to methyl red, and keep it so. Fischer has demonstrated that in patients with disease of the kidneys, the urine of whom cannot be kept alkaline to methyl red, the disease may progress and often lead to complete suppression. Under this treatment the patient usually voids large quantities of urine. Albumin, casts and blood are usually present for several days, and gradually diminish until the urine becomes clear. Most of the patients under observation showed a normal urine from the tenth to the fourteenth day after taking the poison. If the patient has taken over 7 grains (0.46 gm.) of mercuric chloride, and shows marked urinary disturbance, a second, and at times a third, intravenous injection of Fischer's solution is given. The injections are given on successive days.

Previously Weiss has reported the results of this treatment in several groups of patients. At the present time he can report the entire series of 135 consecutive patients poisoned by some form of mercury with only eight deaths, a mortality of less than 6 per cent. These patients took from 1½ to 50 grains (0.09 to 3.25 gm.) of mercuric chloride, usually in tablet form, or similar amounts by drinking a prepared solution or eating mercuric ointment. In only fifteen patients did a complete suppression develop. Of these, seven died; and in the other eight patients the secretion of urine was established, and the patients recovered. The patients who had the most difficulty were of the group that took over 30 grains (1.95 gm.) of mercuric chloride, and those in whom the institution of treatment was delayed.

The vast majority of the patients placed on this treatment do not develop evidence of serious kidney disease except for a moderate albuminuria, which rapidly clears. A free secretion of urine is maintained. The patient usually makes a clinical recovery in from twelve to fifteen days. Examination of several of these patients a year after they were poisoned and treated did not show any abnormality that could be connected with the poisoning.

A New Use for Pituitrin.

In an editorial on this subject in *Endocrinology* for March, 1924, it is stated that in the world-wide pæan of praise of the wonderful new addition to our therapeutic armamentarium, insulin, a single note of dissatisfaction has run. This is a warning of danger from which so potent a remedy could scarcely be free, the danger of hypoglycemia of a degree resulting in discomfort or even death. Two correctives of insulin hypoglycemia have been used from the first, namely, adrenalin and glucose. Through the researches of Burn a third antidote has now been made available, namely, pituitrin.

That adrenalin and pituitrin should have a similar effect on insulin hypoglycemia is surprising in view of the discovery reported by Stenstrom that infundibular extracts suppress adrenalin hyperglycemia. This finding Burn has confirmed. It might be assumed, therefore, that pituitrin would act additively with insulin in further reducing the blood sugar.

Burn's work was done on rabbits in which the reactions to insulin had been carefully determined. For example, to a rabbit having a blood sugar of 121 mg. per 100 cc, 12 mg. of insulin was administered. Forty minutes later the blood sugar had dropped to 64 mg., and after 150 minutes it had reached the dangerous level of 36 mg. Four cubic centimeters of Burroughs, Wellcome "infundin" was then administered, whereupon the blood sugar soon rose to 80 mg. It was found that the antagonistic effect of pituitary extract on insulin hypoglycemia is more extensive, more persistent and much more rapid in onset than that of adrenalin. That the pituitrin effect is not merely an example of non-specific reaction to tissue

extractives was shown by the negative results secured when extracts of anterior lobe of pituitary, of spleen, thyroid, brain tissue or thymus were injected. Similarly, histamin, a very common component of tissue extracts, gave negative results. The method by which pituitrin antidotes insulin hypoglycemia presents an interesting problem for further study.

Therapeutic Inoculation of Malaria.

In an editorial on this subject, the *British Medical Journal* of March 1, 1924, states that in a recent essay on "malaria therapy," Dattner and Kauders of Vienna make the statement that the inoculation of malaria for therapeutical purposes has been employed not only in general paralysis but in other postsyphilitic diseases of the nervous system, such as tabes, cerebrospinal syphilis, and optic atrophy, and also in disseminated sclerosis, Parkinsonism following encephalitis, and hebephrenia, especially the katatonic forms. The treatment is appropriate for cases in which, apart from diseases of the central nervous system, there is no severe acute or chronic disorder of one or more systems present. The patient must be vigorous and in a good state of nutrition. Ill nourished and weakly persons are unsuitable, not so much on account of the risk of complications as because they have not sufficient strength to undergo the necessary number of febrile attacks, and the treatment must therefore be interrupted too soon to get benefit. The method of inoculation they commonly employ consists in a combination of subcutaneous injection and scarification; 2 to 4 cc of blood are withdrawn from the arm vein of the donor and immediately injected subcutaneously into the patient's back; the skin over the site of injection is then scarified, and the remaining drops from the syringe are rubbed into the scarifications. Other methods used are intravenous injection, intracutaneous injection, and scarification without injection.

The incubation period of the inoculated disease varies according to the method of inoculation, being six to ten days after subcutaneous injections, four to seven days after intravenous injection, and ten to eighteen days after intracutaneous injection. The inoculated disease differs from malaria caused by infection with anopheles, the febrile attacks being milder, and the parasites in the blood are fewer and in all stages of development. The average duration of each febrile attack is seven to eight hours, and most patients are allowed to have eight to ten attacks before the treatment is interrupted. In young and vigorous persons the number of attacks may be safely increased to ten or twelve.

The only complication of the inoculated disease observed by the writers was profuse diarrhea, occasionally accompanied by vomiting, and less frequently by slight jaundice of the skin and mucous membranes; usually no enlargement of the spleen was detected. A close watch should be kept upon the heart during the febrile period. Every patient was given ten drops of tincture of strophanthus at the height of the attack, as in about one per cent of cases death due to cardiac collapse occurred during treatment. On this account antipyretics and similar depressing drugs are avoided as far as possible. The malarial infection is brought to an end by administering 0.5 gramme of quinine sulphate internally twice daily for three days, and then once daily for another four days, or a total of 5 grammes.

To prevent relapses before discharging the patient a number of provocative methods of activation of any malarial parasites remaining in the system were employed, such as irradiation of the spleen or injection of sodium nucleinate. The administration of quinine was accompanied, even in non-syphilitic cases, by intravenous injection of salvarsan at weekly intervals in doses first of 0.3 and 0.45 gramme, followed by four doses of 0.6 gramme. In weakly individuals, in whom a dose of 0.6 gramme was not likely to be well tolerated, six doses of 0.45 gramme were given. In cases of non-syphilitic disease of the central nerv-

ous system, such as disseminated sclerosis and Parkinsonism, two to three injections of salvarsan were found to be sufficient. The value of salvarsan in these cases is thought to be due mainly to its antimalarial action. How far it acts on the nervous lesion is a matter of contention.

Important Factors in Bronchial Asthma.

In the *Annals of Clinical Medicine* for March, 1924, LINTZ states that some of the stubborn cases of asthma can be cured if one bears in mind that certain foods, particularly fruits, can produce attacks, not only after ingestion but also by inhalation; such food must not be handled as well as not eaten.

Cutaneous tests are sometimes negative to the specific allergen, because the testing protein is improperly prepared.

Operations nearly always fail to cure or even relieve attacks of true bronchial asthma.

"Hives" and subcutaneous hemorrhages can be brought out by cold.

Cold acts often as a primary factor, like a foreign protein, and is not a contributory cause of asthma, and undoubtedly other physical agents act in a similar manner.

A thorough history is of the utmost importance.

It is often necessary to acquaint oneself with the patient's environment, by visiting the house of the patient, before the cause of asthmatic attacks can be determined. This is illustrated where mice seemingly cause the attack of asthma.

The proteins on the market vary greatly in potency.

When one suspects that a certain substance is responsible for the asthma and the cutaneous tests have proven negative, repeat the tests prior and during the attack and negative results will frequently turn out to be positive ones.

It is not sufficient to explain the precipitation of attacks of asthma by the patient merely encountering the foreign proteins; the state of the vegetative nervous system is also very important.

The stubborn cases of asthma become subjects for research work.

Adrenalin chloride is the best remedy we have for relief in an attack of asthma.

During the interval, remove the cause or desensitize the patient; if this is impossible, calcium iodide and belladonna in large doses, plus foreign protein subcutaneously, autogenous vaccines or sterile milk, are the best remedies for bronchial asthma.

Infections of the Lip.

In the *Journal of the American Medical Association* of March 29, 1924, KAHN states that in considering the treatment of infected lips it is interesting to note that every imaginable procedure has been advocated, including constriction hyperemia; hot wet applications; puncture of center and application of phenol (carbolic acid); phenol injections; crucial incision; crucial incision and injection of the patient's own blood or antitoxin; horse serum; vaccines; Roentgen ray; vaccine with citric acid to increase the clotting time of the blood; galvanocautery, or immediate excision with the knife or cautery.

For the purpose of avoiding confusion in the discussion of the treatment, it is permissible to divide infections of the lip into four stages or degrees, depending on the progress the infection has made:

The first stage is the pimple, with a tiny red or yellow center with no appreciable swelling.

The second stage shows notable redness and swelling for an area from 2 to 3 cm. in diameter. Tenderness, some pain and stiffness accompany this stage, and there is a slight elevation of temperature.

The third stage shows greater and more extensive swelling, with marked elevation of temperature. There is a septic thrombophlebitis.

The fourth stage is the stage of massive blood infection, or septicemia.

If the first-stage cases, the pimples, are let definitely alone, they will almost always take care of themselves. We have all seen this occur in hundreds of cases and are seeing it almost daily. He firmly believes that if no treatment, or *noli-me-tangere* treatment, were practiced in all the first-stage cases there would be no other stage to treat. In the second stage, in which there are redness and swelling of a limited area, hot moist dressings frequently changed, the patient in bed, and a nurse in charge, he believes to be the wisest procedure. The third-stage cases, in which extensive swelling and thrombophlebitis are evident, he thinks should be subjected to operation designed to tie off the vein or veins proximal to the thrombosed area, and the removal of all obviously infected tissue. In the fourth-stage cases, or those in which there is septicemia with positive blood culture, there is no treatment of any avail, so far as he knows. [Never squeeze the parts.—ED.]

The Management of Abortion.

GORDON, in the *Journal of the American Medical Association* of March 29, 1924, states that all cases of abortion, threatened, inevitable, or incomplete, should be treated conservatively until it is demonstrated that conservative treatment has failed.

Conservative treatment, properly executed, will fail in something less than four cases out of a hundred.

The mortality and morbidity in abortion cases is in direct ratio with the degree of intrauterine intervention. The more the manipulation and intervention, the higher the mortality and morbidity.

Curettage in abortion transposes many aseptic cases into septic cases.

Curettage, therefore, is not only seldom indicated, but is often actually harmful.

Conservative treatment has, if possible, a more positive indication in septic cases than aseptic cases.

Peripheral Paralysis as a Cause of Respiratory Failure in Acute Nicotine Poisoning.

THOMAS and FRANKE, in the *Journal of Pharmacology and Experimental Therapeutics* for March, 1924, conclude that respiratory failure in the animals on which they experimented was due to a peripheral, curare-like paralysis of the respiratory muscles, and that the respiratory center continued to function after the administration of nicotine in quantities many times the fatal dose.

The Value of Germanium Dioxide as a Therapeutic Agent in the Anemias of Childhood.

SCHMITZ, in the *Journal of Laboratory and Clinical Medicine* for March, 1924, writes that he feels justified in his conclusion that the rise in the red blood cells and in the hemoglobin content in the cases which he reports in this article were due to the action of germanium. We must remember in comparing the results obtained in the normal with those obtained in the anemias, that in the latter the etiologic factors may still be present to interfere with the regeneration of erythrocytes. The best results were obtained in the anemias associated with malnutrition and acute infections, as evidenced by the marked and sustained increase in the number of erythrocytes and hemoglobin, and by the noticeable clinical improvement.

We have no data at the present time to prove that germanium is of any value in the eradication of the various etiologic factors. For this reason it should not be given with the hope of improving all anemias, but should rather be looked upon as a very helpful agent in stimulating normal erythrocyte formation. Iron in conjunction with germanium may have a more decided influence on the hemoglobin than germanium alone.

The therapeutic action of germanium dioxide was studied in thirteen unselected

cases of anemia in childhood: five cases of anemia following malnutrition and acute infections, two cases accompanying acute nephritis, one case of chronic cardio-valvular disease, four cases of Gaucher's splenomegaly, and one case of von Jaksch's anemia. All the cases, with the exception of the case of von Jaksch's anemia, showed a definite response by marked and sustained increases in the number of erythrocytes and in the hemoglobin content. The most notable results were obtained in the cases of anemia following malnutrition and acute infections. Some clinical improvement was evident in a number of cases.

Surgical and Genito-Urinary Therapeutics

Anesthesia in Minor Surgery.

WOBUS *(Journal of the Missouri State Medical Association*, January, 1924) gives his preference to local anesthesia employing a one-half- to one-per-cent solution of novocaine with or without the addition of adrenalin. It is an art which must be acquired by practice and is not to be employed in an inflamed area or applied to children or nervous individuals.

Nitrous oxide comes first from the standpoint of safety and efficiency, and absence of ill effect; this implies both an apparatus and one skilled in its use.

Ethyl chloride applied locally for its freezing effect is condemned as a method which fools the surgeon but not the patient. Given by inhalation it has rapid effect, which passes off almost as rapidly as it is induced. The method advised is the application of a dozen layers of gauze over the patient's nose and mouth and the spraying on of the drug, the patient keeping his hand raised. When his hand drops the anesthesia is complete. There are some deaths reported from this agent.

Ether Rausch is warmly commended by Wobus, nor are there any deaths registered against it. It is simple in its application, prompt in action, and can be administered by the nurse or even an untrained assistant. Its only drawback is the fact that it sometimes produces a sense of suffocation. Relaxation is not always complete, wherefore the patient may be more or less restless in some cases. In spite of this, however, he will assure you afterward that he experienced absolutely no pain.

Ether Rausch is administered in the following manner: The room should be quiet and all talking avoided. A closed mask of some sort is used—an old felt hat makes an excellent mask. A small sponge or a piece of absorbent cotton is stitched into the top of the mask (hat). After applying vaselin to the face and placing a towel over the eyes, the sponge or cotton in the mask is saturated with ether—15 to 30 cc will usually suffice. The mask is immediately placed over the patient's face, lightly at first. After a few breaths it is firmly applied and a towel placed around its edge. It is well to have the patient count slowly. When he becomes confused or stops counting, which takes a minute or two, analgesia is usually complete and the operation is promptly performed, as the patient usually awakens in from four to six minutes. If necessary, the procedure may be repeated. Moscowics has kept patients in ether Rausch for from one and one-half to two hours.

It has long been known that some brands of ether act more promptly than others. Since all ethers contain impurities, the question arose whether, perhaps, the impurities were responsible for the superior anesthetic qualities of certain ethers. Upon investigation it was found that some of the purest products were the least desirable as anesthetics. The question next suggested itself as to whether absolutely pure ether could

be used as an anesthetic at all. Stehle and Bourne, however, produced pure ether synthetically which was found to be quite satisfactory as an anesthetic. Cotton, of Toronto, who made exhaustive studies of the pharmacology of anesthetic ethers, found that those containing the greatest amount of certain synergistic gases, especially ethylene, not only produced anesthesia more promptly, but produced analgesia without complete loss of consciousness. He thereupon saturated ether with these gases.

Cotton process ether has been used by dentists for several years. Since analgesia is produced before loss of consciousness, it is not necessary completely to anesthetize the patient unless a number of teeth are to be removed.

Choice of Operation in Gastric and Duodenal Ulcer.

SULLIVAN (*Medical Journal and Record,* Jan. 16, 1924) reviews the many operations practiced for the relief of these lesions and believes that the surgical treatment of gastric ulcer should consist in excision or cauterization of the ulcer with posterior gastroenterostomy in the majority of cases. It is in cases especially of the callous type that resection finds its chief adherents. But there are authentic observations proving that ulcer of the stomach may be successfully treated by means of simple gastroenterostomy. The pendulum must not be allowed to swing too far back, however, in the form of unconditional rejection of resection in the treatment of these patients. Recourse fortunately can always be had to gastroenterostomy in those cases in which for some reason or other resection appears impracticable or difficult.

Concerning the choice of operation in duodenal ulcer, it is evident, from a review of opinions, that gastroenterostomy is still holding its own as the safest and most desirable method of procedure. However, Judd points out that there are undoubtedly a group of cases in which it seems well to excise the ulcer in preference to performing gastroenterostomy. Although convinced that the excision of duodenal ulcer will never become a general practice or take the place of gastroenterostomy, Judd recommends excision as particularly indicated if the entire ulcer can be excised and the duodenal lumen maintained, and if the entire operation can be more easily done than gastroenterostomy. Excision is also given the preference in ulcers of the type that bleed during an attack, or in ulcers associated with local pain but with inconsiderable symptoms of dyspepsia. Ulcer excision is better than gastroenterostomy if the gastric acids are not high, and especially if the patient has a tendency to neurasthenia. In all favorable cases for excision, the application of a pyloroplasty should be considered.

The selection of the proper operative procedure in ulcer of the stomach, as well as of the duodenum, involves the necessity of a careful study of the causes back of the ulcer formation, together with their discovery and removal, in order to guard against recurrences and other complications for which the surgical intervention as such is not necessarily responsible. Not only expert technique, but also the scope of the operator's surgical horizon, will raise or lower his standard of cures, while at the same time guiding and governing the choice of operation in the treatment of gastric duodenal ulcers.

The Straight Limb in Pathological Conditions of the Knee-joint.

PARKER (*The Journal-Lancet,* Jan. 15, 1924) observes that the pathologically flexed knee, unless firmly ankylosed, is a weak knee, and, if the deforming process continues inflammatory, is usually painful in walking. The flexion shortens the functional length of the limb and increases the limp. All of these are undesirable complications and should be avoided or corrected.

The extended knee, even in complete paralysis of the limb, will support the body weight, standing or walking; in arthritis it reduces the movements, and thus the

pain, to a minimum, and the extended position gives the greatest length of the limb with the least amount of limping. These are the conditions of comfort and should be secured and maintained. Neglect of these simple principles is so common and the results so distressing that one feels fully justified in emphasizing their consideration.

We are still largely under the influence of the old teaching, that the knee should be held in slight flexion, 10 to 20 degrees, during healing, in order to have a more normal appearing limb when sitting or walking, the shortening enabling the patient better to clear the ground and to avoid a laterally swinging movement of a long leg when making the forward step. As a matter of fact the flexion of 10 to 20 degrees helps very little in shortening the leg or in keeping it out of the way when the person is sitting, and in most legs the additional shortening is not necessary, as the disease itself commonly produces enough. In the occasional case in which the leg is long a thicker sole may be put under the other foot.

Such possible gains from flexion are so slight compared with the certain disadvantages so constantly arising from the practice, that the whole principle of slight flexion for the stiffened knee should be completely discarded and the doctrine of the straight knee established in its place. Moreover, clinical observation shows that the slightly flexed knee is an elusive guide as it can never be depended upon to remain slightly flexed unless in bony ankylosis, but tends by gravity and lack of proper extensor force to increase in flexion and in discomfort and limp.

Physiologically the permanently flexed knee is defective in that it requires for walking or standing constant flexion of the hip and ankle, never allowing the two normal joints to assume neutral positions of rest as regularly occurs with each complete extension of the limb in normal walking. Walking with a permanently extended knee is also not physiological, but at the time when the greatest weight is put upon the limb it is always in the best position to sustain it, which is never the case in the flexed limb. It is far more comfortable, efficient, and becoming than the weak, irritable, and limping condition it has displaced.

Vasotomy for Seminal Vesiculitis.

KIDD *(International Journal of Medicine and Surgery*, January, 1924) describes his technique for the operation advocated and practiced first by Belfield, and in many instances with great success. After pointing out the reasons for finding Belfield's methods unsatisfactory, and on the basis that cure of inflamed conditions cannot be accomplished except by repeated washing, the author thus describes his technique:

The vas is isolated and held close beneath the skin, by a finger and thumb, is freed by a small incision, and is lifted by the flat handle of the knife. The lumen of the vas is opened by a cataract knife and a heavy strand of silkworm-gut is passed into it for about ten inches; this to demonstrate that the vas is patulous. A small cannula of special construction into which a glass syringe will fit is then slid into the vas. Ten cubic centimeters of 5-per-cent colloid silver is injected. If it flows readily, as much again, or even twice as much, may be injected. Care must be taken to prevent leakage into the wound. The vas is anchored to the wound surface by passing a mattress suture from side to side of the scrotal opening, beneath the vas and between it and the vessels of the cord. The cannula is secured to the skin by means of rings attached to its handle. The vesicle can be felt to be distended by the injection, and the presence of the latter in the vesicle can be demonstrated by *x*-ray pictures.

On the second day the injection is repeated, providing it runs in easily, as proven by preliminary injection of a few drops of water. A third wash is given on the fourth day, whereupon the cannula is removed, the soft tissue separated so that the vas drops back and cannot remain adherent to the skin, and the scrotal opening is closed.

The author reports 25 cases operated on since 1914, all but four cured promptly. Indeed the author states that 21 of the cases were immediately and effectively cured within three weeks of their operative treatment. These cases had all had many months, if not years, of the ordinary treatment by means of irrigation, massage, bougies, instillations, drugs, and particularly vaccines, ordinary and detoxicated—yet they had failed to obtain relief. The average length of time they had had the disease was four years, excluding the man who had had it forty-four years; yet they were all cured in three weeks by vasotomy.

Seven of the cases suffered from obstinate and crippling arthritis. They were all cured in three weeks and their joint troubles simply melted away. Two had iritis.

The vas has a powerful sphincter, so that sperm or colloidal silver coming down it regurgitates into the vesicle. The vesicle is certainly a reservoir of sperm. It is lined by a few layers of columnar epithelium which secrete a mucinous fluid. Colloid silver appears to have a softening action on inspissated secretion and plugs present in chronic vesiculitis. When the duct is blocked a fresh opening is formed into the deep urethra through which the softened contents are discharged. This can be seen with the posterior urethroscope.

Vernal Conjunctivitis.

Posey (*Atlantic Medical Journal*, January, 1924) observes that vernal conjunctivitis affects males in about 80 per cent of all cases. It manifests a determined tendency to recur annually with the advent of warm weather.

In mild cases, those characterized clinically by the typical discoloration of the conjunctiva and the appearance of flattened granulations upon that membrane, with but slight or no bulbar involvement and with cessation of symptoms in cold weather, the disease often disappears after a period of from eight to ten years, very rarely in the four to six years mentioned by Saemisch in his classic article. In the severer types, those cases in which there is a persistence of the symptoms, though in less aggravated form, through the winter months, with the presence of large hard and ofttimes rounded granulations studding the conjunctiva, with or without limbal involvement, despite almost continuous alleviating treatment, the disease may continue for twenty years or even longer.

Now that radium is more generally available, the prognosis in vernal conjunctivitis may safely be asserted to be much more favorable and the likelihood of limiting the course of the disease greatly enhanced.

Jackson, in discussing Posey's paper, believed that diagnosis can usually be made from the history, certainly after the first year or two of the affection. There are a few cases, but they are very few, that seem to be as bad in the winter as in the summer. Questioning as to the recurrence from season to season will generally bring out the fact that it first began in the spring, or summer, and has been worse during the warm weather. Seasonal influence is very striking in some cases.

Shumway believes radium should only be employed in the very severe types. The ordinary cases that are seen with a conjunctivitis, with an intense itching that comes on in summer-time, can be treated in other ways and made comfortable until the trouble gradually disappears in the course of years. However, in the severe types there is no question that radium is by all means the most efficient remedy. But it should be used carefully. In the early days, when we had little experience, Shumway saw cases in which there was permanent loss of lashes. In those early cases the radium was applied in one position, but now it is applied in various places across the lid, so that it is not placed in close contact with the lashes at any one point for more than a few minutes.

The radium causes such a quick disappearance of the hard masses, that even in the severe types three or four applications will suffice to clear up the condition. The conjunctiva is not normal after these treat-

ments; there will be a certain amount of atrophy of the membrane as in the late stages of trachoma.

Pancoast in discussing radium states it is practically impossible to assure the patient that the lashes will not come out following treatment. We all know that hair follicles are extremely susceptible to radiation. Even erythema doses will cause falling of hair anywhere, and in case of the eyelid the follicles are extremely close to the surface and the radiation must reach them. It is well to tell the patient that the lashes are likely to fall out, but that they usually grow back. It is very important not to persist in the treatment too long, because of the certainty of scarring of the lids, which is undesirable. If we do not get the result we desire within a reasonable time, and with a few applications, it is better to stop than to treat the case further.

Success with least harmful results is secured by the use of the beta radiation with very little filtration, thus avoiding too much penetration over a very thin structure.

The Splenomegalias.

Mayo (W. J.) (*Boston Medical and Surgical Journal,* Jan. 3, 1924) observing that the spleen, of little value to man physiologically, is endowed with large pathologic possibilities, attributes to it in the early months of fetal life the production of the cellular elements in the blood. Even before birth it loses its power of producing red cells. Morbid processes once started tend to become chronic and slowly progressive. In removing the spleen one removes an agent of destruction, not necessarily the cause of disturbance; the effect may be to cure or relieve the patient of manifest symptoms, the essential cause of disease being rendered ineffective by removal of the agent of destruction.

The earliest blood found in the human fetus is white. The lower orders of life have white blood only. The spleen is an organ which retains throughout life its ability to produce primitive types of white cells. It may not be wholly fancy to regard splenomyelogenous leukemia as an evidence of reversion of the spleen and other reticulo-endothelial organs to their most primitive function, and one might say, without departing greatly from fact, that this disease, characterized by the development of an enormous number of functionless, embryonic white cells, is cancer of the white blood.

The function of the spleen after birth is largely concerned with the destruction of deteriorated red cells. Acting as an agent of destruction, the spleen, enlarged through any one of various causes, destroys an excess of red blood cells, as in splenic anemia and hemolytic icterus. Again, if the hematopoietic system cannot produce normal red-blood cells, the spleen may destroy subnormal red cells, which are capable of functioning and the best the body can produce, thus acting to produce an anemia, which, as Eppinger believes, takes place in pernicious anemia.

The relation of the spleen to the liver is as direct as its relation to the blood. The spleen has a relatively enormous arterial blood supply, but its venous blood becomes part of the portal circulation. This corresponds with the clinical finding that the spleen is an ineffective organ acting as an aid to hepatic function. Thus, the spleen mechanically filters out microörganisms and toxins of colloid size, and sends them on to the liver for destruction. The liver acts on non-oxygenated blood; possibly a by-function of the spleen is to remove oxygen. In specific splenomegalias, such as malaria, the plasmodia may remain indefinitely in a sluggish spleen because of not being sent to the liver for destruction, and from the spleen they act as reinfecting agents. This appears to be true of other protozoa, such as the spirochete of syphilis, and of bacteria, such as the bacilli of tuberculosis, and the pyogenic group of organisms. It requires little imagination to see, in hepatic cirrhosis, an attempt of the liver to encapsulate diffuse poisons carried to it through the portal circulation which it has not been able to eliminate or detoxicate.

In the removal of the spleen, not only a reduction of the portal circulation is effected, perhaps to a point at which the cirrhotic liver may be able to function properly, but also various noxious agents are prevented from reaching the overburdened liver through the agency of the portal circulation.

To Elliott and Kanavel we are indebted for the best description of hemolytic icterus. This malady is a splenomegalia which affects chiefly the red-blood cell and is of two types: the one described by Minkowski as congenital or familial, and that described by Hayem and Widal as acquired. The congenital or familial type may occur in several members of the same family, and perhaps for several generations. The patient, perhaps from birth or early childhood, is jaundiced, has an enlarged spleen and an enlarged liver, and is subject to sudden so-called crises in which there is a temporary increase in the size of the spleen and liver, increase of the jaundice, fever, and malaise, which last for some days and gradually merge into the usual condition of more or less chronic icterus. In every community are to be seen persons with so-called chronic biliousness of this description, some of whom may live to the fifth or sixth decade. Usually death results from anemia or intercurrent disease before middle life.

The cure of hemolytic icterus by removal of the spleen presents a striking picture of the good results of surgery. In four days the anemic, jaundiced, debilitated patient may have, perhaps for the first time, a clear, white skin. In a few weeks the anemia disappears entirely, and if the patient is young there is a most extraordinary increase in stature and weight, a development of greater energy, and a buoyant outlook on life. In the forty-nine cases in which the spleen was removed in the clinic for hemolytic icterus, the operation was difficult in only one, and there have been three operative deaths.

In the somewhat rare disease, polycythemia rubra vera, the blood picture is striking, the hemoglobin may be as high as 130, the red cells range from 6,000,000 to 12,000,000 or 14,000,000, and the viscosity of the blood is increased, making the patient appear cyanotic. The spleen is always enlarged, and in the later phases also the liver.

A more satisfactory name for hemorrhagic purpura, at least in the more severe forms, would be essential thrombopenia, because the latter indicates a scarcity of blood platelets, which is the most important feature of the disease. Essential thrombopenia should not be confused with the toxic or other purpuras in which the bleeding time is prolonged, but the number of blood platelets is not markedly decreased. This disease is usually seen in the period of adolescence. It is characterized by hemorrhages, subcutaneously, from the nose, and from the intestinal tract. In the female, menorrhagia may be very profuse. Patients are alternately better and worse, but always show evidence of the disease, which eventually terminates in death. Two such patients have been operated on in the clinic. The first of these patients, operated on eight months ago, a woman aged thirty years, in the terminal stage of the disease, had suffered for two years and had been in bed for six months. Four hours after removal of the spleen the blood platelets had increased from 40,000 to over 200,000. In two weeks the patient was quite well, and has remained so. The second patient, a young woman aged twenty years, was splenectomized October 27, 1923, with equally striking beneficial results.

The relation of the spleen to pernicious anemia has not been fully determined. The anemia, color index, appearance of the tongue, achylia, paresthesias, and the cord changes are well known. Eppinger was the first to attempt to relate the spleen directly to pernicious anemia. In the postmortem examination of persons who have died from pernicious anemia the spleen usually is found to be small, perhaps from terminal shrinkage; during life the spleen is often enlarged and may be palpable. There are no changes in the organ characteristic of the disease.

The blood in all splenectomized patients who have been observed still shows characteristics of the disease. Many unsplenectomized patients with pernicious anemia live as long as two years, or perhaps longer. It is evident that pernicious anemia is not always one and the same disease. It is also evident that there is the greatest and most prolonged improvement following splenectomy in cases in which the syndrome is not well established, while in the case of elderly persons with the aplastic type of the disease in the terminal stages, little permanent benefit is derived from operation.

Patients with pernicious anemia should not be splenectomized during a crisis. Because of the extraordinary effect of radiotherapy in the reduction of the spleen of patients suffering from splenomyelogenous leukemia, he began using radium in all such cases, and in selected cases performed splenectomy. Under such circumstances the procedure is easy and safe. In thirty cases in which operation was performed, the author has had but one death, and this was from pulmonary embolism in the second week, when the patient was up and around. A few of the patients are so free from evidence of the disease that the accuracy of the diagnoses has been doubted. Other patients are greatly relieved and have had, on the whole, sufficient prolongation of comfortable existence to make the operation worth while, if it be done early in the course of the disease, and in the more chronic types.

The symptoms and progress of splenic anemia are often intermittent. Quiescent periods may last for months or even years with the patient healthy, but the disease eventually leads to death. In a considerable percentage of late cases, coincident cirrhosis of the liver, of the portal type described by Banti, has been found. One of the most serious complications of splenic anemia is gastric hemorrhage, the patient succumbing to this complication, or to the anemia which results from it. Such hemorrhages greatly resemble those of other origin associated with portal cirrhosis of the liver. Instead of supposed rupture of varices, which has long held the stage as the cause of this type of gastric hemorrhage, perhaps changed function of the liver accounts for many of the hemorrhages that occur from splenic anemia, as well as those that sometimes occur without demonstrable cause. Such hemorrhages, unfortunately, are not always permanently relieved by splenectomy. Ten patients of the ninety-three on whom was performed splenectomy for this condition had hemorrhages from two to six years later, and eventually died, either from the hemorrhages or from coincident diseases, of which the hemorrhages were a notable symptom. In these ninety-three cases there were ten deaths in the hospital, but not all the deaths were directly associated with the operation, as many of the patients were in the terminal stage of the disease, with ascites, edema of the lower extremities, and advanced cirrhosis of the liver.

When one sees patients with advanced cirrhosis of the liver, ascites and hemorrhages from the stomach, recover following splenectomy, and remain in excellent health for years, the liver regenerating sufficiently to care for the reduced circulation, one cannot justifiably refuse to operate, even in the advanced cases that give the high mortality. As the spleen is always very adherent in these late cases, the operation is trying and formidable.

Fifteen of the splenomegalias were due to acute or subacute bacterial infection involving the spleen, all occurring as residue of acute pathogenic infections, tonsillitis, osteomyelitis, and various other easily recognizable causes. In the series there were five deaths from splenotomy, and only six of the patients were cured.

Tuberculous splenomegalia is one of the best known of this bacterial group, in which the process may be limited to the spleen. The spleen was removed in the clinic in six cases of this type, with one death in the hospital.

Of the splenomegalias due to protozoal disease, those caused by the spirochetes pallida and the plasmodium of malaria are the most common in the temperate zones, while

in the tropics bilharziasis and kala azar are common.

A greatly enlarged spleen has been removed in the clinic in nine cases of chronic syphilis, in all of which the patients had been treated thoroughly without success, and were in the terminal stages of the disease. In each case removal of the spleen, in which were found spirochetes and small gummas, immediately relieved the patient. Within two weeks the enlarged gummatous liver had shrunk to normal size and position, the Wassermann reaction soon became negative with little further treatment, and the anemia promptly disappeared.

No cases of splenomegalia from malaria requiring splenectomy have been seen in the clinic. The modern quinine treatment of the plasodium of malaria is so efficient as to be a true specific.

The evidence at hand goes to show that there is a potentiality for harm in the chronically enlarged spleen, and if the enlargement does not yield within a reasonable length of time to suitable medical treatment the spleen should be removed if it can be done safely. They operated on one such case with complete success.

Mayo summarizes his admirable paper as follows:

The function of the spleen concerns the blood and is closely associated with the liver.

The spleen is chiefly a mechanical filter, which removes from the blood degenerated red cells and toxic agents above colloid size, such as microörganisms and débris, on which it acts before sending them to the liver for further detoxication and elaboration; it also develops lymphocytes.

While the function of the normal spleen is not important, the diseased spleen is a serious menace to the constituents of the blood and to the liver.

The spleen apparently does not initiate the pathologic processes with which it is concerned, but acts as a secondary agent.

Removal of the spleen in the splenomegalias and in certain blood states removes a pathologic agent, or breaks up a vicious circle.

In the estimation of the benefit to be derived from the removal of the spleen, the entire syndrome of which it is a part must be considered.

A chronically enlarged spleen which does not yield to reasonable medical treatment should be removed early, unless, in the individual case, there are contraindications.

Surgery of Spastic Paralysis.

GAENSLEN (*Wisconsin Medical Journal*, January, 1924) makes a clinical classification of paralysis as congenital, acquired, intrapartum and acquired postpartum. In the congenital type there may be absence or underdevelopment of entire convolutions or various degrees of porencephalitis. In Little's disease there is probably imperfect myelinization of the pyramidal tracts in children prematurely born. In those due to injury at birth the pathological end result is dependent upon brain contusion and intracranial hemorrhage with thrombosis congestion and edema or cyst formation involving destruction of the cortical cells in a considerable area. In some cases only slight irritative lesions result. Those acquired postpartum result from the various forms of meningitis and encephalitis, the pathological end result being due to the associated inflammatory processes involving meninges and cortex.

The clinical picture will vary with the location, degree and extent of the cerebral involvement. The three components, muscular weakness, spasticity, and incoordination, are present in all possible combinations. The mentality is infrequently affected, and here too impairment may be either slight or of very marked degree, amounting to actual idiocy. In most cases certain muscle groups are much more affected than others, so that disturbance of muscle balance results.

The muscular weakness may be completely overshadowed by the spasticity. The so-called scissor-leg gait in which the adductors of the thigh are overactive is characteristic of one of the common types.

Normally all muscles are in a state of

constant moderate tonus, resulting in what may be called a normal muscle balance. When this tonus is unequal, disturbance of muscle balance results and awkwardness in gait or other movement follows. This normal tonus depends upon an intact reflex arc including both cerebral and spinal elements. Sensory stimuli reaching the cortex are transformed into efferent or motor impulses traveling down the upper motor neurones which connect with the anterior horn motor nerve cells in the spinal cord. It is assumed that in cerebral injuries associated with hemorrhage the function of the inhibitory fibers in the pyramidal tracts is interfered with so that their dampening or regulatory effect is lost. The excitation of the lower motor neurones is therefore excessive and results in overaction of the muscle groups involved.

Muscle training deserves first consideration. It has been well said that the success of every method depends finally on muscle training, but before muscle training can be applied to advantage, existing deformities must be corrected.

Efforts at muscle training before correction of deformity may be counted as time wasted. Correction of these deformities is accomplished by simple tenotomy or myotomy or by gradual stretching. Having overcome these obstacles, the logical attack is on the reflex arc, the unregulated activity of which is responsible for the muscular spasticity and incoördination. Direct attack on the intracranial lesions has been advocated by Sharpe & Farrell of New York. They published a series of sixty-five carefully selected cases subjected to bilateral decompression, in all but four of which they found a supracortical lesion, most often a cyst. These cysts were punctured and the walls removed as far as possible. In about forty per cent more or less improvement resulted. The improvement they attributed to diminution of pressure on the cells of the surrounding cortex.

In cases of spastic paralysis associated with Jacksonian epilepsy Krause and others have recorded improvement in a few cases following an attack on the cortical lesions. On the whole, however, results of intracranial surgery have not been encouraging, at least in cases of long standing.

Foerster has attacked the reflex arc on the sensory side by laminectomy and section of the posterior nerve roots corresponding to the spastic muscle groups, and while he has had excellent results in a comparatively large series of cases, this operation has never become popular on account of the relatively high mortality. In collective statistics the mortality has reached 15 per cent.

Stoffel added a new procedure to the surgery of spastic paralysis by neurectomy or resection of sufficient portions of the motor nerves to the overacting muscles. Thus in case of adductor spasm resulting in scissor-leg gait, the nerve of the adductor muscles is resected, resulting in sufficient weakening of this group to balance the adductors against the antagonistic abductors, with immediate relief of spasm. This operation has been used for relief of spastic overaction of practically all groups in both the upper and lower extremities. In the lower extremities resection of the nerves for spastic flexion of the knee and for plantar flexion of the foot is often required.

Whereas in the case of the adductor muscles the isolated nerves can be attacked, the problem is somewhat simpler than in cases in which the nerve to be resected forms a part of the larger nerve trunk from which it must be isolated before resection. Stoffel has done a real service by his painstaking studies on the internal anatomy of nerve trunks. He found that the individual peripheral nerves can be traced upward some distance into the common nerve trunks as separate strands which can be isolated readily from the main trunk, also that in the larger nerve trunks these different strands occupy more or less definite relations to one another. They are not gathered into a common cable to mingle indiscriminately. Thus in a cross-section of the median nerve the fibers to the pronator radii teres occupy an anterolateral position, while the bundle for the finger flexors occupies a dorsal position in the

trunk. This internal anatomy of the larger nerves has been worked out in great detail by Stoffel.

While this definite arrangement of the individual nerve bundles in the larger trunk is of great value in the isolation of nerves to spastic groups, accurate determination by means of an electrode should be resorted to, in order that there may be no doubt as to the identity of the nerve tract to be resected. The suspected nerve tract is very carefully freed from the main trunk for a distance of several centimeters. The strand is then lifted away from the trunk and gently stimulated with a needle electrode, using the very weakest current which will elicit a muscular contraction. By observation of the resulting muscle contraction, the identity of the nerve bundle is determined beyond question. Depending upon the degree of spasticity a portion of the nerve bundle so isolated is resected a distance of about 5 centimeters, the thickness varying as a rule between one-half and two-thirds of the whole bundle.

Contraindications to any of these more radical procedures are marked athetosis, also spasticity so diffuse and inconstant that no particular group may be considered as dominating the picture, and marked mental impairment rendering the patient unable to coöperate in the tedious after-treatment or unable to utilize possible improvement in locomotion.

In this connection due allowance must be made for the rather remarkable mental improvement sometimes accompanying improvement in locomotion. It is just as though the child's mind formerly engrossed in combating ungovernable trunk and extremities is now freed from this burden and ready to receive and act more coördinately on the incoming sensory stimuli.

A rigid course of after-treatment is absolutely essential to success, no matter what surgical measures are employed, and this point is emphasized by all as the crucial point in every method. This is best carried out under supervision of a trained personnel able to give the children sufficient time and to instruct the parents in the use of simple apparatus in the home. Walking-bars, pendulum exercises, obstacle walking and a number of other devices, and, above all, infinite patience on the part of both physician and trainer, are essential.

As to prophylaxis, much may be done by the obstetricians to prevent the development of these deplorable effects in the cases due to intracranial hemorrhage in the new-born. The need of careful pelvic measurements before delivery and substitution of Cæsarean section for high forceps, with their well-known attendant dangers, should be emphasized. Sharpe urges careful examination of infants during the first days of life, especially in cases of difficult labor, for early signs of intracranial hemorrhage, and prompt decompression when necessary. Sharpe, Cushing and others have operated successfully on a considerable number of such infants. In view of the distressing character of the late results of hemorrhage, early operation holds out the greatest hope.

Notes on 350 Appendectomies.

Johnson *(United States Naval Medical Bulletin,* January, 1924) reports on operations done in naval hospitals, hospital ships, and other naval vessels, as well as a few performed in civil hospitals. With few exceptions the men were officers of the navy, from which the physically unfit are supposed to be excluded. In more than half the acute cases there was no rise of temperature up to the time of operation; some of these were severe, even gangrenous. Those with a temperature above 102° were all found to have abscess, peritonitis, or some complicated condition; usually in the lungs. In the early stage of the disease the pulse-rate offers little help in diagnosis or prognosis. Frequently there is no increase in the rate; even in very severe cases with rupture or peritonitis the pulse-rate may remain normal. Nausea and vomiting have been early and constant symptoms of the disease, usually appearing within three or four hours of

the initial pain. If vomiting occur before pain the affection is not appendicitis. As to leucocyte count a considerable number of patients showed only a moderate increment. The differential count is regarded of greater value. Hewitt's rules are quoted with approval, to wit:

"First, the absolute count, when taken alone, is of questionable value.

"Second, the polynuclear count alone is, in the great majority of instances, a reliable index in diagnosis.

"Third, the correlated absolute and polynuclear counts are of greater value than either count taken alone, especially as regards prognosis.

"A high absolute count with a high polynuclear count means usually a good prognosis *(e.g.,* absolute, 35,000; polynuclear, 95 per cent). A high absolute count with a moderately low polynuclear *(e.g.,* absolute, 30,000; polynuclear, 80 per cent) means usually a very good prognosis. A low absolute count with a high polynuclear count *(e.g.,* absolute 7000, with polynuclear 95 per cent) indicates a grave prognosis (speaking generally). A low absolute count with a low polynuclear count means *(e.g.,* absolute 7000, with polynuclear 65 per cent) usually no infection, or that the acute condition is due to anatomical or mechanical causes; in other words, that the infection, if one be present, has not stimulated the resisting powers of the body sufficiently to produce a leucocytosis.

"Fourth, normal or subnormal figures do not necessarily indicate the absence of suppuration, gangrene, or their sequels.

"Fifth, catarrhal cases, fulminating cases, moribund cases and walled-off abscesses frequently do not stimulate leucocytosis."

In the cases under consideration the white-cell count proved of considerable value. Those with a count of 8000 or below were all mild. Those above 15,000 were more serious than those below that figure, and those above 20,000 were all gangrenous, ruptured, or had bronchitis as a complication.

Chronic appendicities must be considered as a possibility in nearly every case of chronic abdominal distress. There is a strong tendency to blame the appendix for every case of chronic indigestion in which the diagnosis is difficult. This is largely because we know of a definite thing to do for that condition—remove the appendix. The danger of making this quick and easy diagnosis before eliminating all the other possibilities is shown by the frequency of postoperative persistence of symptoms.

The following rules have proved very useful in diagnosis: Most cases of chronic appendicitis follow acute attacks which have recovered without operation. It is stated that there is no chronic appendicitis without a previous, definite, acute attack; hence a careful history is important. While pain in the right iliac region is the most important single symptom, if pain is limited entirely to this regioin it is probably not chronic appendicitis. Practically every case of chronic appendicitis gives a history of pain and digestive disturbance. The more difficult it is to determine the cause of chronic indigestion, the more likely it is to be the appendix.

Bastedo's test for chronic appendicitis is made by passing a tube about 10 inches into the rectum and injecting air by means of a bulb. As the air pressure increases, the pain and tenderness are greatest near McBurney's point if there is chronic appendicitis. Several surgeons have written in praise of the test, while others have not found it reliable. Rosenbloom found the test positive in each of 14 cases of chronic appendicitis and negative in each of 26 cases not having this condition. The author tried this test in 22 cases of suspected chronic appendicitis, but the results were so inconstant and so difficult to interpret that he found it of little value.

The McBurney gridiron incision was used in 66.8 per cent of the cases, a rectus incision in 22 per cent, a low midline incision in 1.5 per cent, and 9.7 per cent

were removed through a herniotomy incision. The advantages of using the McBurney incision when pus is present are many. It gives quick and easy access to the appendix without soiling other peritoneal areas. All manipulations are done in the safe region to the outer side of the cecum and one can avoid spreading infection to the dangerous region median to the cecum. Drainage through the operative wound or by a stab wound in the flank is easily arranged through the gridiron incision.

There are certain cases in which, after the peritoneum is opened, it is seen to be inadvisable to remove the appendix during the acute stage. When rupture has occurred, resulting in a walled-off abscess, and removal of the appendix involves breaking down the wall; when free pus is found and the appendix cannot be removed without much manipulation and soiling of new areas, then it is best to drain and get out as quickly as possible. When the appendix has ruptured it has already done the worst of which it is capable, but the surgeon who takes pride in fetching home an appendix every time he goes after one may greatly increase the damage by spreading the infection with his meddlesome fingers.

In 52 cases the appendix was removed as a routine measure in the course of laparotomy for other conditions. Thirty of these showed gross pathology; 22 were considered normal; 14 contained concretions.

Drains into the peritoneal cavity are unnecessary when, after elimination of the cause of the peritonitis, there is no great difference in the appearance of one part of the peritoneum from another. In other words a diffuse peritonitis, no matter how bad, does not require drainage, but a localized peritonitis or abscess should be drained. A necrotic or gangrenous appendix does not require drainage if all of the necrotic tissue is removed.

The resistance of the peritoneum to infection is very much greater than that of the tissues of the abdominal wall. When the tissues have been soiled during removal of the appendix it is safe to close the peritoneum and leave a drain down to it. If infection develops it makes a hole large enough to insert a small Carrell tube, and if there is no infection it can be removed in twenty-four to forty-eight hours without interfering with the healing of the wound. Turbid fluid or plastic exudate is not sufficient reason for drainage. When a walled-off abscess is found within the peritoneum the Carrell-Dakin method, properly applied, will clean it up much more quickly than any other method. When the abscess is superficial to the peritoneum, in the tissues of the wall, this method is even more valuable because of its ability to dissolve necrotic tissue and remove the sloughing aponeurosis which usually delays the healing process. This property of dissolving necrotic tissue belongs to Dakin's sodium hypochlorite solution and not to chlorazene.

Countless writers and speakers have reiterated for years the warning that appendicitis must be excluded before it is safe to give a cathartic in such cases. Yet a great number of patients, on arrival at the hospital, state that they went to the sick-bay with pain in the belly and the medical officer or corpsman gave them salts or castor oil without examining them.

Testicular Transplantation.

THOREK (*Endocrinology*. January, 1924) has conducted an experimental and clinical research characterized by a desire to find the truth rather than by a wish to demonstrate a proposition. He has found that transplants of sections of the testes usually disappear and very promptly. In part he attributes this disappearance to pressure incident to unwise choice of site for transplants. He suggests and has used the supraperitoneal space in the region of the deep epigastric vessels and the retrorenal fossa between Gerota's capsule and

the endoabdominal fascia. Pressure is effectively eliminated in either of these places.

It is noted that Berthold in 1849 made autotransplants of the testes of cocks into their abdominal cavities with preservation of male characteristics. The belief commonly accepted to-day is to the effect that the spermatogenetic portions of the testicle are concerned only with spermatogenesis, whilst the interstitial cells, the Leydig cells, have a distinct glandular function responsible for sex characters, desire and potency. The Leydig cells are of epithelial origin and form a true gland of internal secretion. When these interstitial cells are preserved, even in the absence of other cells, male characteristics persist. To the Sertoli cells is attributed the function of acting as nutritive cells to the sperm cells.

Torek castrated six adult male apes. This was followed by a brief period of excessive sexual activity, thereafter by impotence. Homotransplantations were then performed on five of the apes, and a sixth had a cryptorchitic human testicle implanted into him. The testicles of similar animals were subjected to the action of the *x*-ray sufficiently to destroy all seminiferous cells, but not strong enough to devitalize the Leydig cells. Subsequent to the roentgenization of the testes removal of specimens from some for microscopic study has proved them to have become "interstitialomas" in the sense of Bolognesi and others (composed of interstitial cells alone). In this manner every element of doubt as to the absence of the spermatogenic cell has been eliminated. The roentgenized testes were then implanted into the castrated apes. Gradually these animals became potent and cohabited with females of the same species. The cynocephalus in whom the cryptorchitic testis had been transplanted showed a reappearance of sexual ardor about six weeks after implantation. Removal from the cage in which the female was stationed into a cage where another male shared quarters with him caused his sexual ardor to become so great that very active pederasty was practiced between the two, the animal (male) carrying the transplant playing the active part and the other male a passive rôle.

The cryptorchid testicle transplanted into monkey No. 6 showed the characteristic cryptorchid picture with the well-known thickening of the seminiferous tubules, the disappearance of the characteristic contents, and the extraordinarily hypertrophied interstitium.

A study of the cryptorchitic testis removed two months after its implantation showed the microscopic appearance. The transplanted human testis into the macacus nemestrinus graphically illustrates and emphasizes the total absence of seminiferous structure and the substitution of Leydig cells and newly formed blood-vessels in the implant. Very few Sertoli cells were found, and it stands to reason that the Leydig cells contributed to the incretory function in these experiments and that the other elements may reasonably be excluded as having furnished any hormone whatever.

These experiments show 66⅔ per cent of successes (return of potency after hetero- and homotransplantations), 16 1/6 per cent failure, and 16 1/6 per cent partial failure. Or, expressed differently, of the homotransplants they had 75 per cent successes and 25 per cent failures. The transplant from the cynocephalus to the macacus nemestrinus was a complete failure, while the heterotransplant of the cryptorchid testis from the human was a thorough success. Following castration 50 per cent of the animals showed a transitory hyperstimulation of sexual activity, followed in a shorter or longer period by complete impotence.

In human implants the age of the donor is to be considered. He must have arrived at sexual maturity and be sexually normal from every point of view, preferably between the ages of nineteen and thirty-five. He must be free from syphilis, tuberculosis, malignancy, neoplasms, etc.

Human testes may be kept refrigerated anywhere from twenty-four to seventy-two hours and still be used for therapeutic implantation. The sooner they are implanted,

however, the better. In the absence of human tissue the testes of the higher apes may be used (chimpanzee, cynocephalus). None of the other species show any blood relationship (precipitin test; Nuttall, Thorek) and if implanted are extruded, as are the testes of sheep, goats, rams, and other lower vertebrates.

The site of implantation is important. Lichtenstern and others have failed to obtain good results because of the pressure to which the implant has been subjected.

Implants treated according to the Lespinasse technique after two weeks were far advanced on their way to absorption, and in most of his cases at the end of the twenty-fourth day not a trace of the implant could be found. In some cases a very minute remnant could be discovered as late as the fourth week, but none thereafter. The parenchyma of the testicle when exposed to surrounding structures is very early attacked by leucocytes, etc., and is absorbed.

The old cannot be made young! No organ or set of organs can be returned, by any method thus far discovered, to a juvenile state when pathologic or advanced senile changes have made inroads on the structures and rendered them senile, in the accepted sense of the term.

The field of usefulness for such implantation is varied and includes many conditions. Improvement in certain well-defined pathologic states can be anticipated in properly selected cases following the use of proper material and the employment of proper technique. Undoubtedly further research and the accumulation of clinical data will place therapeutic gonadal implantation more firmly as a valuable addition to the armamentaria of the progressive physician.

Implanting the testis in its entirety causes a rapid regression because the tunica albuginea is very tough and is not readily penetrated by capillaries. Thorek, therefore, evolved a plan of destroying small parts of the tunica albuginea by means of the electric cautery, thus exposing the tunica vasculosa. The testis then becomes rapidly vascularized from the surrounding blood-vessels. He calls this procedure "lanternization" for want of a better term. The testis is then transplanted in its entirety.

The Hormone of the Anterior Hypophysis.

An editorial from *Endocrinology*, January, 1924, thus reviews some recent important experiments bearing on this subject:

In a broad way the views of Engelbach and Tierney as to classification of types of pituitary disease might be summarized, as considering the osseous abnormalities and secondary disturbances of gonad function (development of genitalia, secondary sex characters, and menstrual function) consequent to abnormal anterior lobe secretion, whereas the metabolic peculiarities (obesity, polyuria, glycosuria, etc.) are consequent to posterior lobe disease.

When a powerful smooth muscle stimulant was isolated from the posterior lobe (pituitrin—also known by other names), of great clinical value in obstetrics, in shock, etc., and when, furthermore, this substance was found to reduce the thirst and polyuria of diabetes insipidus in a remarkably specific manner, the latter syndrome became associated in many minds with disease of the pars intermedia and posterior lobe. But when Camus and Roussy and Bailey and Bremer were able to reproduce diabetes insipidus and even dystrophy adiposogenitalis in dogs by producing lesions in the hypothalamus, more particularly the tuber cinereum, without any injury to the hypophysis, the whole subject of pituitary responsibility in these conditions had to be considered.

In view of this confusion, it was all the more welcome that P. E. Smith's ingenious hypophysectomies in tadpoles resulted in such reliable and clean-cut evidence. These tadpoles did not metamorphose, because their thyroids could not develop normally in the absence of the hypophysis; they remained albinos, they grew slowly, and they became obese.

In the anatomical laboratories of the University of California, Evans has recently

prepared extracts from the several lobes of the beef hypophysis. These extracts, freshly prepared and almost protein-free, were administered intraperitoneally by Smith to his hypophysectomized tadpoles. This specific therapy entirely corrected the abnormalities alluded to above. The growth-controlling principle, and the hormone influencing the normal development of the thyroid, interrenal bodies, and probably the gonads, was confined to the anterior lobe. The hormone correcting pigmentary upset was present in all three lobes, as was the principle which reduced the enlarged fat organ.

Those clinicians who have been convinced of an obesity of pituitary origin, difficult to reduce by diet or by the organ extracts at present available, will be especially interested to note that Smith was unable to reduce the large fat organ of his hypophysectomized tadpoles by either starvation or thyroid feeding, but obtained complete specific response by intraperitoneal injection of the fresh pituitary extract just mentioned.

The climax to these carefully controlled and conclusive experiments came in the announcement by Evans and coworkers of unmistakable production of gigantism in rats by prolonged injection of anterior lobe substance. Thus finally we have the long-awaited experimental proof that gigantism and acromegaly are due to an excessive secretion of the glandular portion of the hypophysis.

If this anterior lobe substance, when available, duplicates these remarkable results when tried in human beings, if it will stimulate skeletal growth in subjects of Lorain and Froehlich infantilism, produce normal development of genitalia and secondary sex characters, restore menstruation in post-adolescent amenorrhea, and reduce girdle obesity, then there will have come to pass another epochal achievement in medical therapeutics of the same brilliance as the discovery of insulin.

Reviews

NOTES ON THE MEDICAL TREATMENT OF DISEASE. For Students and Young Practitioners of Medicine. By Robert Dawson Rudolf, M.D., F.R.C.P. Second edition. University of Toronto Press, 1923.

The contents of this volume are well described by its title, namely, "Notes on the Medical Treatment of Disease for Students and Young Practitioners of Medicine." It does not attempt to be a text-book of Therapeutics. Rather it would seem a verbal picture of what the author himself does, or would do, were he called upon to treat any of the diseases which he discusses, which vary all the way from angina pectoris and aneurism to the various acute infections. Not infrequently a prescription is interpolated with the idea of illustrating the direct application of one or more drugs.

In the article on typhoid fever we confess to a difference of opinion in regard to milk diet, as we believe that the milk diet which was at one time so largely adhered to has always to be added to it, except in rare instances, other foodstuffs which have a higher caloric value, with particular reference to carbohydrates. Thus, the author suggests that six imperial pints of milk a day give about 2400 calories, but there are many patients who are unable to take this quantity of fluid, or approximately three quarts. Furthermore, a person who is ill with typhoid over a period of 21 to 28 days, while, of course, at rest in bed, is by the nature of his disease requiring about as many calories as does the individual who is taking active exercise. This, however, is so minor a criticism that it must not be mistaken for a severe one.

The author recognizes the necessity for dividing treatment into that which is for

the relief of symptoms and that which we hope will be advantageous from the standpoint of the cause or pathological condition which is present. As illustrating the "safe and sane" attitude of Dr. Rudolf in matters therapeutic, we quote what he says in regard to pneumonia: "The question should not be what is the treatment of pneumonia, but rather how can we best care for the patient so that he may weather the pneumonic storm." Until we have absolute specifics for each and every infection, this rule must universally hold true.

DISEASES OF THE CHEST AND THE PRINCIPLES OF PHYSICAL DIAGNOSIS. By George William Norris, A.B., M.D., and Henry R. M. Landis, A.B., M.D.; with a chapter on the Electrocardiograph in Heart Disease by Edward Krumbhaar, Ph.D., M.D. Third edition, revised. W. B. Saunders Company, Philadelphia, 1924. Price $9.50.

The first edition of this book appeared in 1917 and at once took its place as a valuable contribution to this topic, containing a large amount of the literature on the subject, but more important than all, the views and knowledge obtained by its authors by reason of large practical experience. At present it is quite a massive volume numbering more than 900 pages, which are large in size and fairly closely printed. Great care has been taken in revising and enlarging the book, and some parts have been rewritten, but we are glad to note that the authors, while recognizing the advances made in laboratory technique, nevertheless insist upon the importance of physical diagnosis as carried out without such aids. The profession has been passing through an era in which laboratory technique has been raised to the highest peak, but is gradually coming back to the normal level with a recognition that both of these means of investigation are to be employed, and with the recognition of the equally important point that all patients do not need laboratory technique, but do need a careful examination.

In this edition, as in previous ones, the chapters upon Examination of the Lungs are contributed by Dr. Norris, who also discusses the Examination of the Circulatory System, whereas Dr. Landis deals with Diseases of the Bronchi, Lungs, Pleura and Diaphragm, the Pericardium, Heart and Aorta.

The book, as we have already intimated, shows that its authors have been keen to keep themselves well informed of the advances made by clinicians here and abroad. It is copiously illustrated, not only with pictures of patients, but with pathological and normal cross-sections of the human body to show the position of organs.

The first edition did much to place its authors in the first rank of American clinicians, and this, the third edition, will do still more in keeping them in this enviable position.

DISEASES OF THE EYE. A Handbook of Ophthalmic Practice for Students and Practitioners. By George E. de Schweinitz, M.D., LL.D., Professor of Ophthalmology in the University of Pennsylvania. Tenth Edition, Reset. Octavo of 865 pages with 434 illustrations and 7 colored plates. Philadelphia and London: W. B. Saunders Company, 1924. Cloth, $10.00 net.

Few text-books have commanded so prominent a place in the daily work of the student and the practitioner as this work, which has just reached its tenth edition, entirely reset, with many new illustrations, and with the subject-matter corrected to include the recent advances in this special branch of medicine. The success of the book, which has required the preparation of new editions at frequent intervals, has to a considerable degree been due to the concise and comprehensive presentation of the subject-matter, so that the student readily finds a full description of all the diseases of the eye and their treatment, as well as the newer methods of diagnosis. The practitioner confidently consults its pages to learn the behavior of the eye in many of the general diseases which he is called upon to treat.

Reference to the following subjects is made either for the first time or, having been previously included, has been somewhat elaborated: The diaphragm lamp (Gullstrand); contact illumination; binocular visual acuteness, and illumination and

acuteness of vision; sunlight as a source of illumination; simple centric ophthalmoscopy; opthalmoscopy with red-free light; agricultural conjunctivitis; striate clearing of corneal opacities; uveoparotitis; hernia of the vitreous; senile changes in the optic nerve; temporary amaurosis in infants; extraction of cataract by suction (Barraquer); tendon transplantation; muscle recession with scleral suturing; "cinch shortening" operation.

The new material added, the arrangement of important chapters, and the large personal experience of the author insures a proper valuation being placed on observations which have appeared in recent years in ophthalmic literature.

W. M. S.

GOITRE. Non-surgical Types and Treatment By Israel Bram, M.D. The MacMillan Company, New York, 1924.

Our readers will be interested to know, in these days when surgical interference with the thyroid gland is so popular, that the author of this book has compiled a volume of more than 450 pages, fairly closely printed, dealing with this important subject in clinical medicine in a most exhaustive way, his design being to emphasize the fact that there are non-surgical cases as well as surgical ones, and that it is a grave error for the physician to recommend operation in the non-surgical type.

He has made himself familiar with the literature of the subject by a good deal of reading of American, English, and Continental journals and monographs.

After dealing with the anatomy and physiology of the thyroid gland he proceeds to a consideration of the pathology of non-surgical cases, to a consideration of the etiology of exophthalmic goitre and its symptoms, to a consideration of the eyes, and of miscellaneous symptoms in exophthalmic goitre, with details as to diagnosis. He then deals with that portion of the volume which will most interest our readers under the heading of Guiding Principles in the Non-surgical Management of Exophthalmic Goitre, dealing with prevention, hygiene, diet, local measures, the drugs which are indicated and contraindicated, and psychotherapy. Chapter XXVII contains case histories and illustrations of discharged patients designed to illustrate the permanency of non-surgical recovery from exophthalmic goitre. Copious bibliographies are appended to certain chapters.

While this volume will in no way, in all probability, modify the views of those who are strong believers in surgical interference, its text is one which they cannot afford to ignore, and it should be a factor in making both physicians and surgeons more conservative in the advice which they give patients.

MODERN METHODS OF TREATMENT. By Logan Clendening, M.D.; with chapters on special subjects by several authors. Illustrated. The C. V. Moseby Company, St. Louis, 1924. Price $9.

We are told in the preface that the purpose of this book is to present a comprehensive statement of the best modern thought and practice upon the treatment of diseases included in the general term internal medicine. The author criticizes the existing books on treatment on the ground that they are badly balanced, that they include too much, that they do not give sufficient detail, that they fail to represent modern thought, that they are written in "atrocious English," to use his phrase, and, therefore, he has concluded that it was in his power to prepare a book which would possess none of these faults.

The volume is printed on heavy paper, large type, well leaded, and is easily read. It includes radiotherapy, climatotherapy, heliotherapy, psychotherapy, and various miscellaneous procedures, such as lavage, the fitting of supporting corsets, the therapeutic use of adhesive tape, heat and cold, and almost every therapeutic subject which is employed by various practitioners.

So far as we have been able to observe, the advice which is given is excellent. As to whether the author has been successful in avoiding the "atrocious English" which he says others are guilty of, we refer that point to those who may possess the book.

We question somewhat whether this vol-

ume will be widely used as a text-book for students. It will, however, appeal to many practitioners, because of the very important points which it thoroughly covers.

EXAMINATION OF CHILDREN BY CLINICAL AND LABORATORY METHODS. By Abraham Levinson, B.S., M.D. Illustrated. The C. V. Moseby Company, St. Louis, 1924. Price $3.50.

Dr. Levinson is the Associate in Pediatrics in the Northwestern Medical School, Chicago. He dedicates his little volume to his students, who, he says, are his best teachers. Without doubt contact with students does much for every teacher of medicine in improving his knowledge. The object of the book is well described in its title. The illustrations are chiefly clinical, but in some instances well show the results to be attained by laboratory methods. It would be a mistake, however, to consider from the title of the book that nothing is said as to therapeutics. On the contrary, much therapeutic information is given. Indeed, the reader will get almost as much of this as he will of technique or physical signs.

Printed on heavy paper with heavy leading and a broad page, the book is easily read and is most attractive in its appearance.

It can be most cordially recommended as a useful book for senior students and practitioners.

TWELFTH ANNUAL REPORT OF THE MEDICAL DEPARTMENT OF THE UNITED FRUIT COMPANY, Boston, Mass., 1924.

A year ago we called attention to the very remarkable report made by the Medical Officer of the United Fruit Company, and emphasized the fact that it was interesting to see how a well-organized business concern appreciated that the proper maintenance of health and cure of disease was a factor in business which could not be ignored. It is not possible in this brief review of a volume which covers nearly 200 pages to take up in detail all that this report covers. It is not only of value from the standpoint of hygiene, but from the standpoint of clinical medicine as well.

When we point out that in Honduras they have added to their hospital building 12 beds for first-class female patients, 15 for second-class female patients, and a new two-story building equipped with an *x*-ray laboratory and isolation ward, it gives some idea of the activities at one point. Again, when we learn that in order to provide a satisfactory water supply for employees an eight-inch pipe-line twelve and a half miles long has been constructed, and that a reservoir with 17,000,000 gallons capacity is under construction, we get another glimpse of wide endeavor. Lectures are given to employees designed to protect health. More than 28,000 cases were treated in the hospitals of the United Fruit Company, 10,170 were treated on steamships, more than 4000 were treated by port medical officers, and 100 steamships were fumigated. Furthermore, a new radio medical service has been established by which distant employees at sea, or at distant land points, may get good medical advice if no medical officer is at hand. Last of all, no less a person than Mallory, of Boston, has been retained as a consulting pathologist, for the study of specimens which may be brought north from the district controlled by the United Fruit Company, in order that a better conception of tropical diseases may be obtained.

It is to be hoped that other commercial concerns, if not from the standpoint of humanity, at least from the standpoint of good business, will imitate this excellent effort.

FERTILITY AND STERILITY IN HUMAN MARRIAGES. By Edward Reynolds, M.D., and Donald Macomber, M.D. With a section on The Determining Causes of Male Sterility, by Edward L. Young, Jr., M.D. Illustrated. W. B. Saunders Company, Philadelphia, 1924. Price $5.

The reason for the compilation of this book exists in what the authors believe to be the great increase of professional interest in the subject. They point out that the diagnosis and treatment of cases of this nature have long been considered to be within the province of the gynecologist, and that it is only within recent years that the shoe has been put on the other foot and that

the genito-urinary specialist has been recognized as one who should be consulted in many of these patients. They also emphasize the fact that the specialist should be a good enough general practitioner to recognize that health of the entire organism is an important factor to be considered.

The book is divided into twenty chapters; dealing with this subject as a biological problem, with statistics as to sterility, and with the various disorders and diseases of the male and female which have to be taken into consideration; and it emphasizes more than once, as we have already pointed out, the necessity of constitutional measures in many of these patients.

The book is evidently written with the idea of presenting the personal views of its various authors and without the intent of quoting largely from the contributions to this subject made by other workers in this field. Medical men who are interested in this subject will doubtless be glad to peruse its pages.

Medical Clinics of North America. July, 1924. W. B. Saunders Company, Philadelphia, 1924.

This is the so-called New York number of the Medical Clinics of North America. and in the space of a little over 400 pages we find reports from the clinics of no less than thirty-one practitioners. Many of the lecturers are universally known among the medical profession. The themes cover, naturally and properly, a very wide field, varying from functional disorders simulating organic disease to syphilis simulating tuberculosis and such semisurgical subjects as post-pyloric ulcer and three cases of spinal cord tumor. Most of our readers are already familiar with the large type which makes this quarterly contribution to medical literature easily read.

Life Insurance Examination. Edited by Frank W. Foxworthy, Ph.D., M.D. Copiously illustrated. The C. V. Moseby Company, St. Louis, 1924. Price $9.

The editor of this book has for many years been interested in life insurance from the medical standpoint. In preparing the text he has called to his assistance a large number of men who are connected with life insurance companies from the medical standpoint. Indeed, almost every well-known life insurance company in the United States is represented by some medical officer.

It is pointed out in the Preface that policies aggregating over $60,000,000,000 are now in force in the United States alone, and that many companies have assets of more than $1,000,000,000.

The text is divided into 47 chapters. There are 156 illustrations. It opens with a discussion of the History of Life Insurance Examinations by Toulmin, Medical Director of the Penn Mutual Life Insurance Company of Philadelphia.

The methods of examination of various parts of the body which are particularly worthy of investigation by the medical examiner, the conditions which one would suppose would make the candidate for insurance so ineligible that the medical examiner has little need to go into detail concerning such an individual, as, for example, cancer of the prostate, the testicle, and tumors in other portions of the body, are discussed. Needless to say, there is an excellent chapter upon urinary analysis. There is even a chapter upon Army Service as an Insurance Problem, and one upon the Insurance of Sub-standard Lives. Naturally, too, we find a chapter upon Examination for Health and Accident Insurance by Wilson of the Traveller's Insurance Company of Hartford. There is also one upon Fraud and the Influence of Occupation on Life Underwriting.

The Collected Papers of the Mayo Clinic and the Mayo Foundation. Edited by M. H. Mellish. Volume xv, 1923. Published June, 1924. W. B. Saunders Company, Philadelphia and London, 1924. Price, cloth, $13 net.

It is stated in the foreword of this volume that it marks a departure from the previous policy in that because of the number of papers contributed to current literature, and often because of their technical nature, it has been impossible to include all

of them, even in abstract form, in the annual volume. Therefore, the present book is a complete reference record of all papers for the year 1923 from the Mayo Clinic and the Mayo Foundation, each being published either complete, abridged, abstracted, or by title. Papers published in full and those abstracted are such as would seem to be of interest to general physicians or general surgeons. Those who are unable to obtain journals containing original papers abstracted or published by title may in some instances be supplied with reprints by writing to the Division of Publication of the Mayo Clinic.

In the section devoted to the Surgery of the Alimentary Tract, Vinson, after describing the method of dilatation for cardiospasm, by means of dilating bags at a pressure varying from 16 to 28 feet of water, comments on the prompt relief following this treatment. He observes recurrences in about 25 per cent of cases, usually noted in about six months. As bearing on Carcinoma of the Esophagus, he states that half of all esophageal tumors are malignant. In 90 per cent of patients more than forty years of age, without a history of previous trauma, who have had dyspepsia for a year or less, malignancy is the cause of the obstruction in the esophagus. Surgery for the cure of this lesion is still in the experimental stage. Operation does not prolong life to any appreciable extent, and no cures have been reported from radium and Roentgen-ray treatments.

Nakamura contributes a study on Focal Infection and Elective Localization in Ulcer of the Stomach and in Arthritis, excellently abstracted, with the conclusion that "the tonsils of patients suffering from ulcer of the stomach and arthritis commonly harbor streptococci which tend to localize, respectively, in the mucous membrane of the stomach and in the joints, and to produce ulcer and arthritis in them, which is not true of streptococci in the tonsils of normal persons."

Bearing on this subject Rosenow notes that "Streptococci were isolated consistently in pure cultures or in predominating numbers from a series of ulcers in the hog, calf, cow, sheep, and dog. This organism was demonstrable in the tissues, and the number was roughly proportional to the acuteness of the condition. There was an increasing incidence of pure cultures in the tissues as the distance from the source of contamination, the ulcerated surface, increased. Ulcer, hemorrhage, and infiltration of the stomach were produced in 86 per cent of the rabbits and dogs injected with the freshly isolated cultures from ulcers in the different species, often with no lesions elsewhere. Similar results were obtained with cultures of the streptococcus from the infected tonsils in the cow and dog that had ulcer. The streptococcus was demonstrated in, and isolated from, experimentally produced ulcers when other tissues were sterile, and produced ulcer on reinjection. Specific localizing powers were retained for seven and one-half years in two of three strains preserved in ascites-glucose-agar shake cultures, layered with oil."

The results of the immunization experiments indicate that the streptococci from ulcer, even of different species, are closely related and probably specific of this disease; that a practical method for preserving specific antigenic power has been developed; and that active and passive immunization should prove helpful in the prevention and treatment of gastroduodenal ulcer in man.

An experimental study in the production of peptic ulcer by Mann and Williamson is summarized as follows: "Experiments were devised for diverting the secretions which neutralize the gastric juice, as it leaves the stomach, to another portion of the intestine removed from the point of emergence of the acid. Under such conditions typical subacute or chronic peptic ulcer, quite comparable pathologically to that found in man, developed in the intestinal mucosa just adjacent to the gastric mucosa in a high percentage of cases."

Balfour contributes further observations on the Use of the Cautery in Peptic Ulcer, Partial Gastrectomy for Gastrojejunal Ulcer, and, in an abstract, a paper on Factors of Safety in Gastric Surgery.

Judd contributes liberally and in his characteristically lucid and direct style.

William Mayo contributes papers on the Splenomegalies, the Surgery of the Hepatic and Common Bile Ducts, coöperation of Human Vegetative Functions, other papers bearing on underlying factors in the hospital administration, and a study of the septic factor in the three great plagues.

Charles Mayo writes on the function of the Thyroid Gland.

Boothby and Pemberton contribute papers on the Mortality of Thyroid Operations.

Braasch and Foulds, writing on Post-Operative Results of Nephrolithiasis, state that the actual recurrence following conservative operation in the kidney is less than 11 per cent; that the recurrence if a fluoroscope is used is under 5 per cent.

Bumpus reports 678 nephrectomies for tuberculosis, with a mortality of 2.3 per cent. As to the late mortality more than half the deaths occurred during the first year. Braasch has reported the mortality for the first five years as about 20 per cent, giving a prognosis for recovery of about 80 per cent.

Mayo and Walters report on the End-results in Thirty-five Cases of Exstrophy of the Bladder, with Transplantation of the Ureter into the Rectum.

Bearing on the use of Radiation in the Treatment of Benign Hypertrophy of the Prostate, Bumpus reports lessening of symptoms but no results in cases of marked enlargement with retention.

Plummer and Boothby contribute a valuable paper on the value of Iodine in Exophthalmic Goitre. Of 600 patients treated with Lugol's solution no one has been made worse. It is stated that all who have observed the improvement in exophthalmic goitre following the administration of Lugol's solution are convinced of its value in this disease.

Charles Mayo and Pemberton comment on the effect of iodine in lessening mortality. Of 703 thyroidectomies for exophthalmic goitre performed from January 1, 1922, to May 1, 1923, the mortality was 0.85 per cent.

Wilder sets forth his excellent plan for the use of insulin by the overworked general practitioner. "The indispensable equipment includes a good food balance, a table of food values, Benedict's or Haines's solution for qualitative determination of urinary sugar, and a 10-per-cent ferric chloride solution for determination of diacetic acid in the urine."

Bearing on Calcium Treatment in Cases of Edema, Rockwood and Barrier show that each liter of milk contains from 7 to 12 gm. of calcium lactate, and that the importance of milk in the treatment of acute nephritis may have in part its basis on the diuretic effect of the high calcium content.

From a study of Professional Blood Donors, Giffin and Haines observe that 500 cc when given at intervals of four or five weeks have not been found to be hurtful; indeed, more than one-fourth of the donors felt better after blood had been taken than they did before. It is advised that a general survey of the donors' condition and the repetition of the Wassermann test and blood count should be made every six months.

It is impossible to exaggerate the value of this volume. As has been said of its predecessors, it is the most important contribution in book form of the year, and one almost as valuable to the practitioner as it is to the surgeon. There is an increasing amount of research and profitable research and larger attention is devoted to function. The abstracting of papers is a desirable feature, and the complete indexing of all publications should be helpful to those who wish to consult the originals.

Correspondence

A Case of Bite of the Pigmy Rattlesnake.

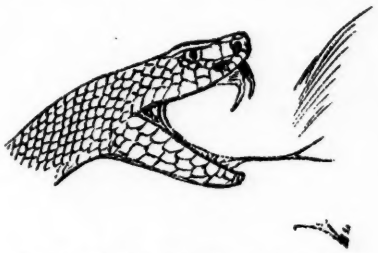
To the Editors of the THERAPEUTIC GAZETTE.

SIRS: While in Florida last March and April, I visited my friend, the naturalist, Mr. Richard F. Deckert, who lives at Buena Vista north of Miami. Mr. Deckert's great interest, like my own, is in herpetology, and for the past two years he has been painting for me the turtles and tortoises of North America. On the occasion of the visit I inspected a collection of live snakes, and among others a fine pigmy rattler, an adult not over twenty inches in length. Subsequently, under date of June 3, Mr. Deckert writes me that his pigmy rattler bit him with distressing sequelæ, and owing to the paucity of reports of such cases, I am

Shows left fang sliding off thumb-nail while right fang enters the flesh.

relating this well-observed one largely in Mr. Deckert's own words:

"It may interest you to learn that my little pigmy rattler bit me in the left thumb two weeks ago, while I was changing his water. Only one fang entered; the other one slid off on the thumbnail. I had a very painful thumb, not being able to sleep for two nights. Immediately on being bitten, I cut across the puncture with a safety razor blade and sucked it out, then bathed the thumb in a solution of permanganate of potash. There was



Side view showing erected fangs. Natural size.

a swelling of thumb and hand and a dull pain at the wrist, elbow-joint, and under the arm. The next day a dark blotch appeared under the arm. After two days the worst pain and swelling subsided, but the tip of the thumb is still numb and painful on pressure. There was a constant draining off of a clear yellow serum-like liquid with a little pale blood, therefore I kept a pad and bandage on the thumb for a week. It is now completely healed and the epidermis at the tip and around the nail has sloughed off. The bite occurred on Sunday evening about 6 o'clock, and several times during the following two hours I felt slightly nauseated, which would pass off on my lying down. I thought it might interest you to have this in detail. I might add that never for a moment did I doubt but that I would easily recover from it, but I knew I was in for a few days of most severe pain. It was a lesson to be more careful and never to take foolish chances with a poisonous reptile."

Mr. Deckert's accident occurred as a consequence of that familiarity with dan-

ger which notably brings contempt and induces carelessness. My own bite by a moccasin a year ago (reported in the THERAPEUTIC GAZETTE) occurred in a somewhat similar way. My right index-finger is permanently somewhat numb in consequence and is distinctly colder than the other fingers in winter, and sensation is blunted; fortunately for tactile sense I have always depended upon my left index.

Death from the bite of a pigmy rattler is rare, in fact I do not recall a case in an adult.

Mr. Deckert did all that could be done under the circumstances. There is no

Top view of head.

serum available which is of any use. The permanganate is a chemical antidote and is only serviceable if applied at once to the tissue infiltrated with the venom.

The danger from poisonous snakes in this country is minimal and is no excuse for killing every little snake in sight. The most dangerous snake, the rattler, is easily recognized and can be killed if deemed necessary. Practically none of our poisonous snakes are aggressive, and their attitude always is, "If you let me alone, I'll let you alone," thu' du mir nichts, Ich thu' dir nichts! Our readiest and most persistent fighter is the harmless, lively, nervous, wide-awake black snake, so useful in the destruction of rodent pests.

HOWARD A. KELLY, M.D.

BALTIMORE, MD.

The Treatment of Syphilis.

To the Editors of the THERAPEUTIC GAZETTE.

SIRS: Your interesting Leader in the July issue of the GAZETTE on the Treatment of Syphilis, in which you say that "natural immunity is more effective in preventing a second inoculation than is the treatment by antisyphilitic remedies," and also your remark that the prophylactic use of arsphenamine after exposure is disappointing, reminds me of a case which emphasizes both of these statements. During the War we were trying in some of our hospitals in England the effects of salvarsan on many cases of trench fever. One soldier who for this purpose had been given a full course of this form of arsenic was on the day after the last dose exposed to syphilitic infection, and a month later developed a typical hard chancre. Evidently this man was not protected, although his blood was loaded with arsenic. If a person who is already under the influence of the drug is not immune, it is still less likely that he will be protected if this be only given after infection has taken place, although, of course, the disease may be largely controlled.

I remain, sirs, yours faithfully,

R. D. RUDOLF,

Professor of Therapeutics in the University of Toronto.

TORONTO, CANADA.